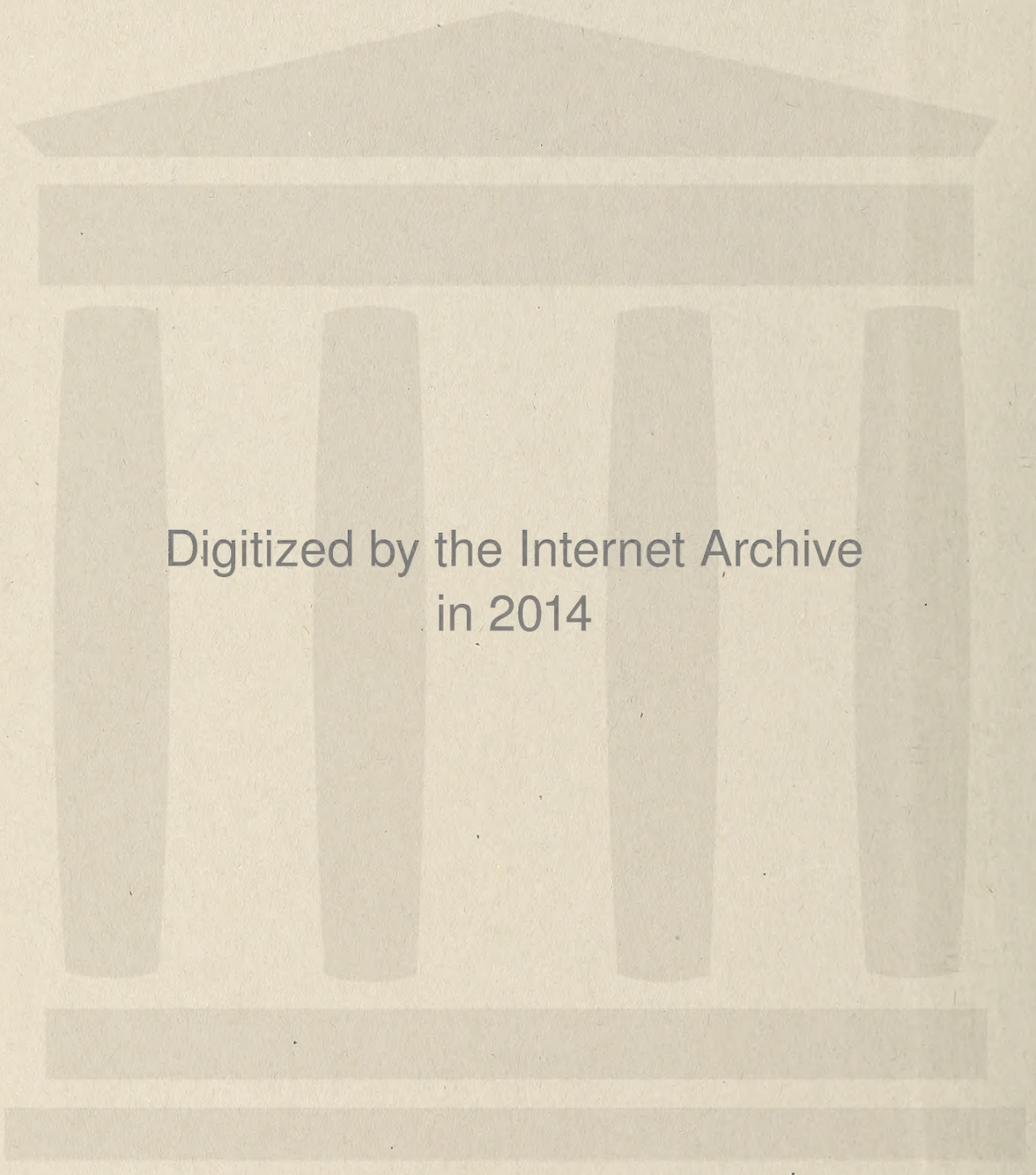

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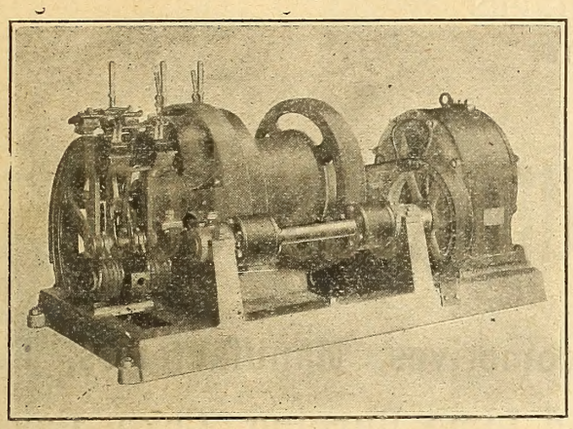

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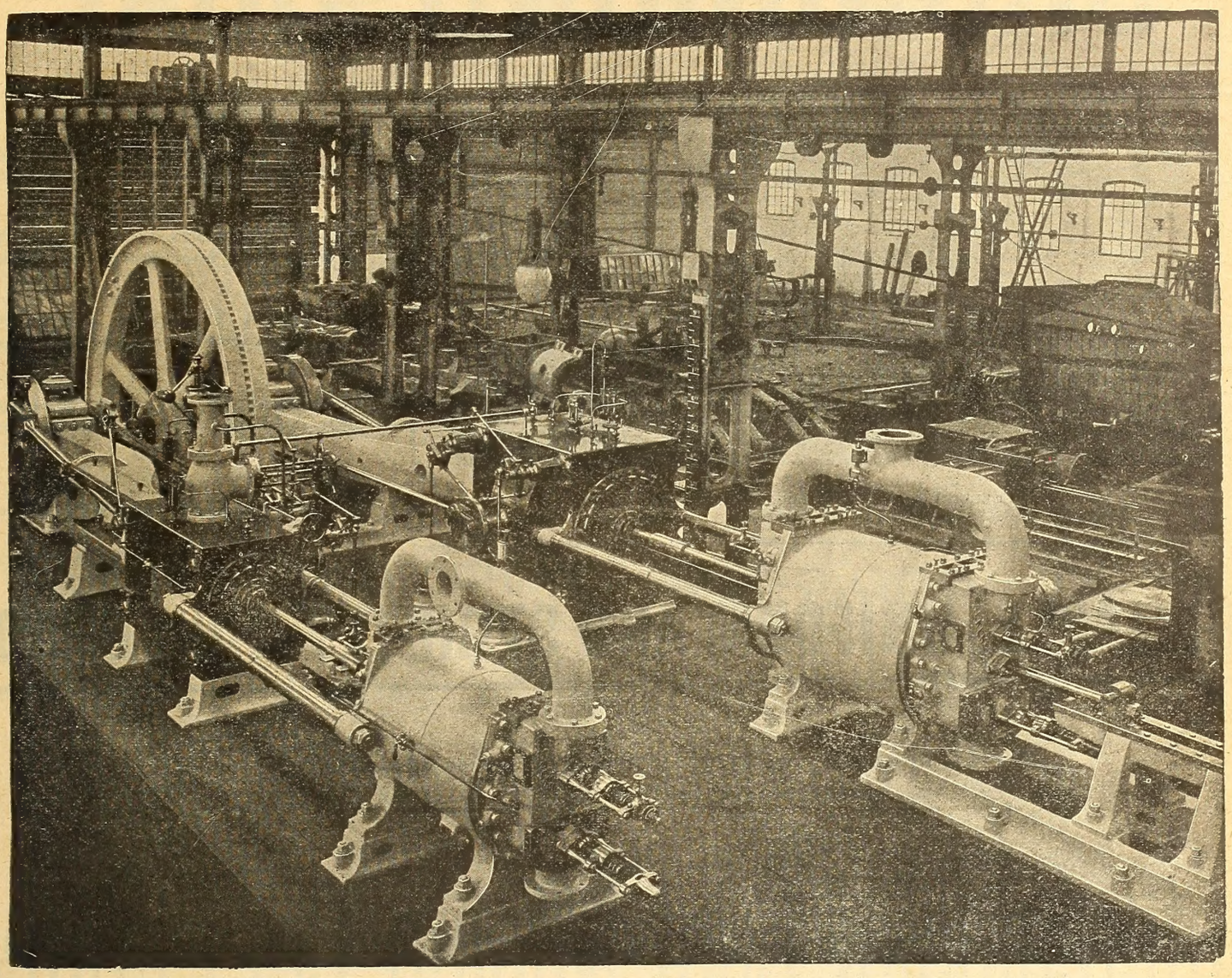

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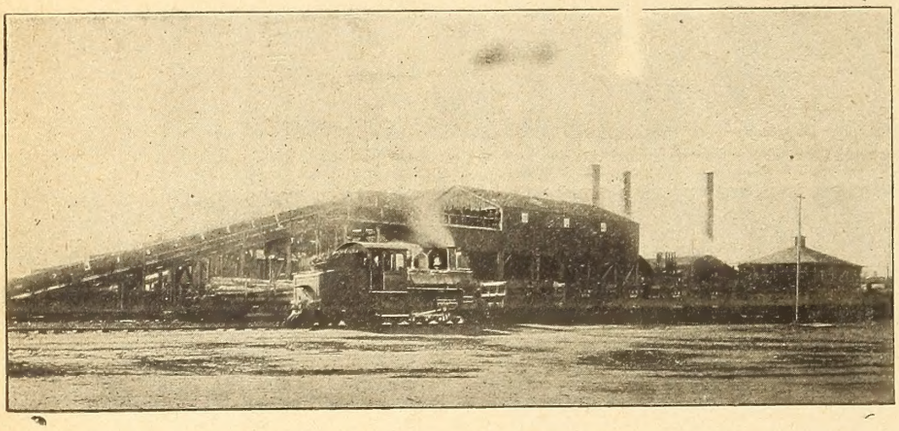

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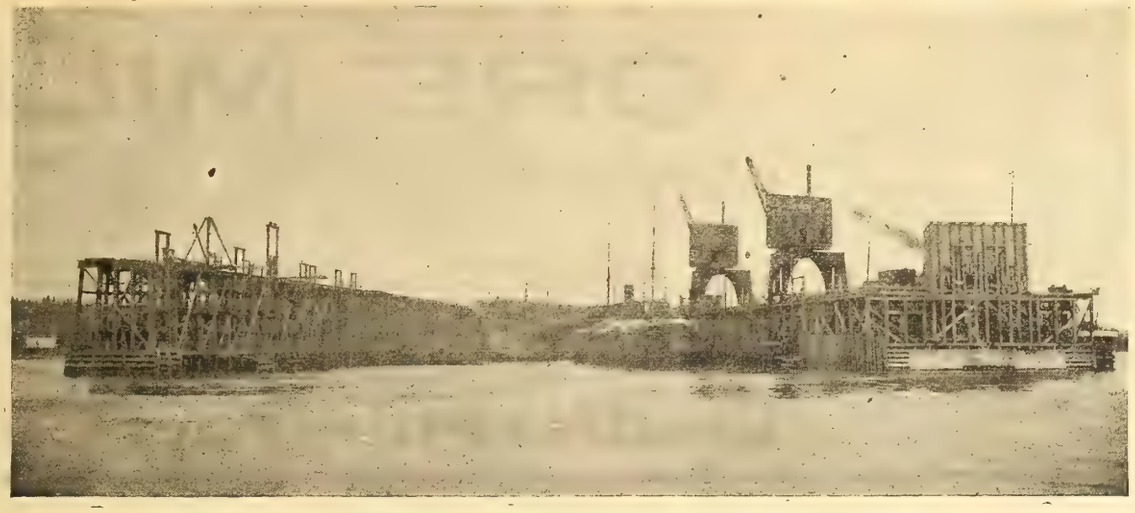

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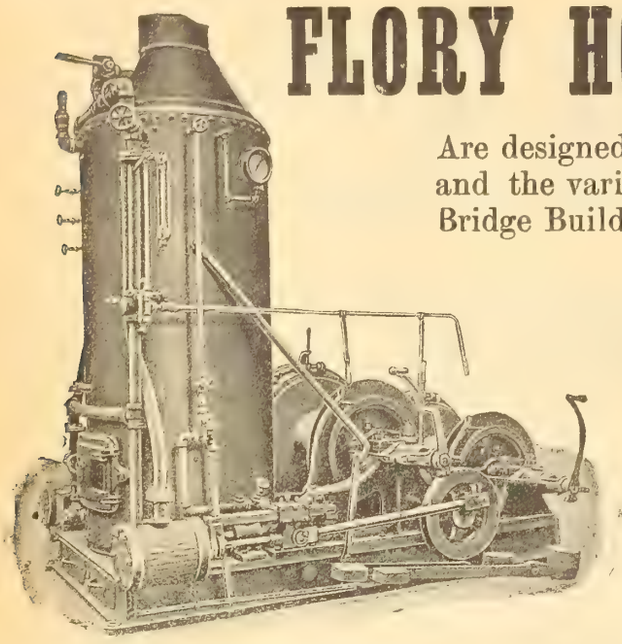

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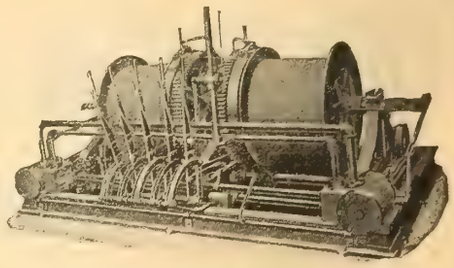

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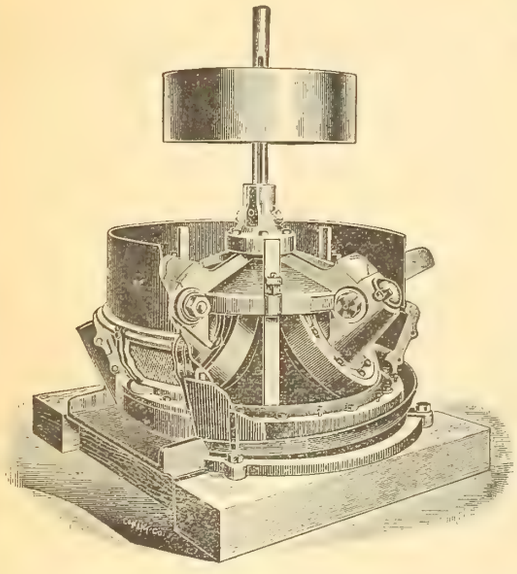

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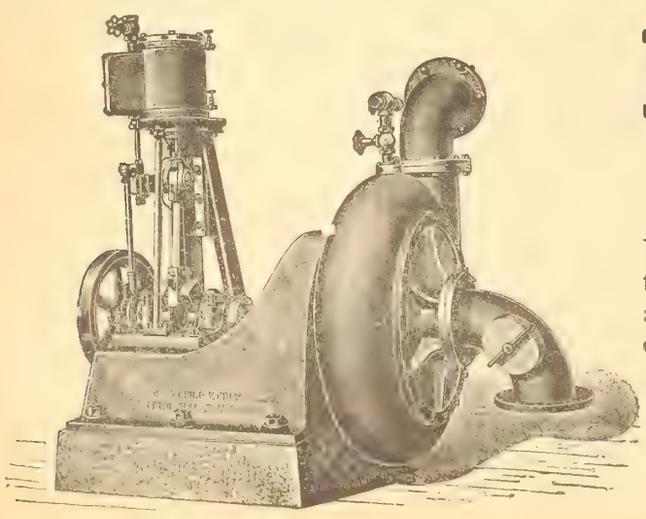

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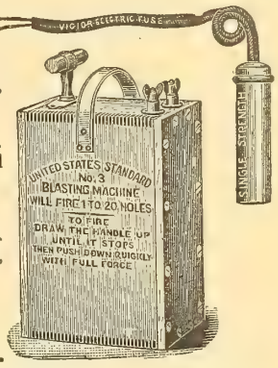

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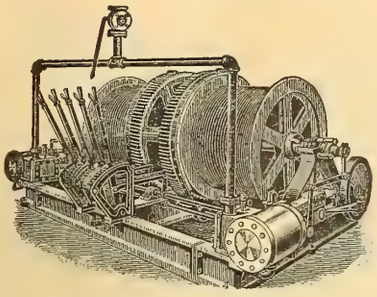

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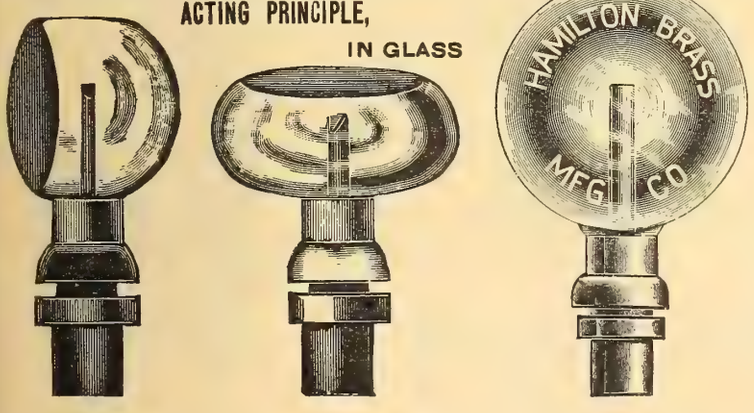

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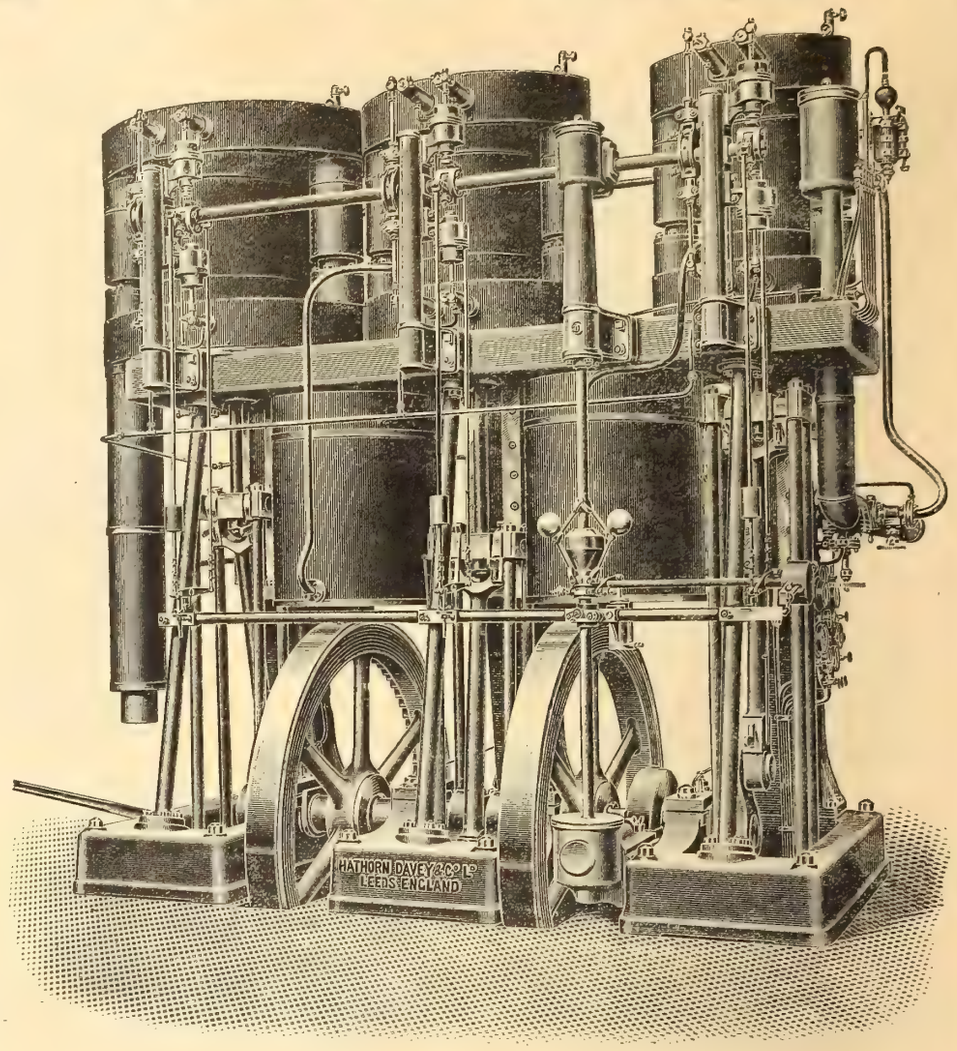

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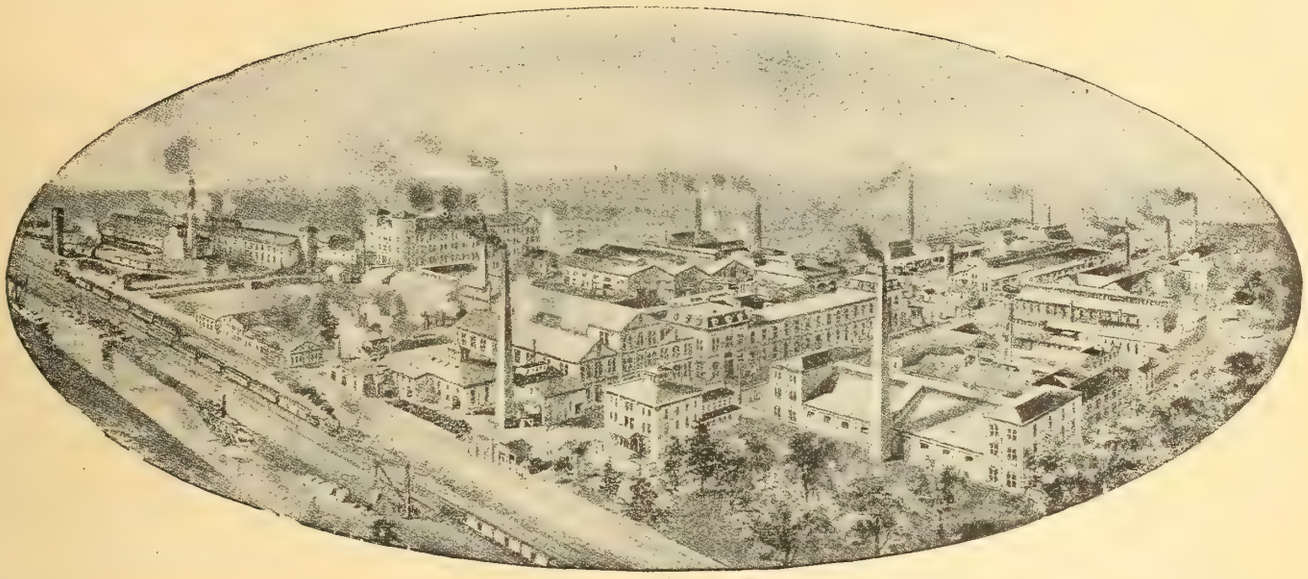

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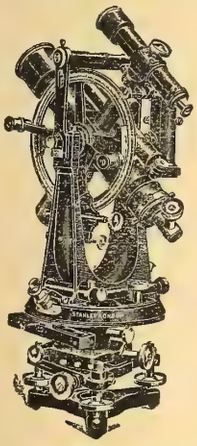

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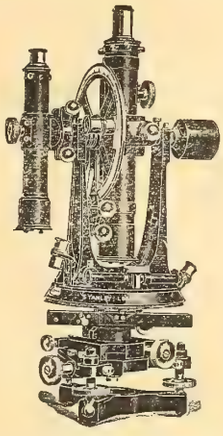

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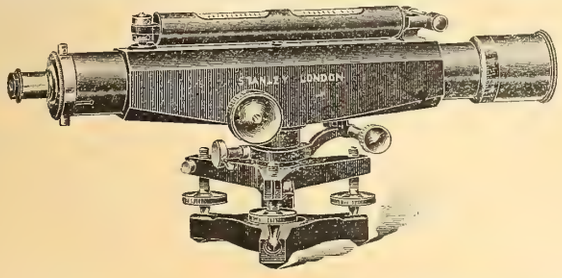

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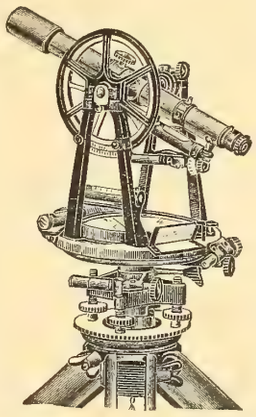

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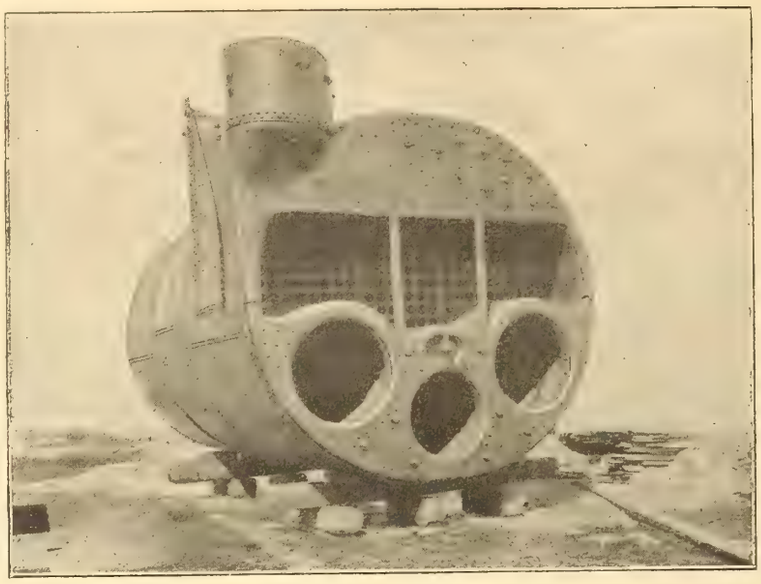

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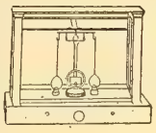

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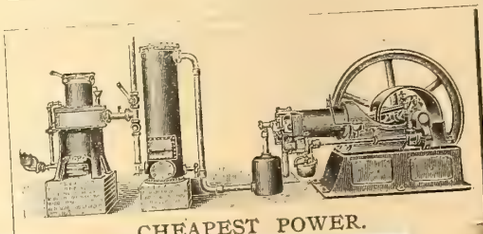
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The Council of the Institute will award a Gold Medal, presented by the President, for the best paper contributed by student members to the Transactions of the Institute during the year 1904.

STUDENTS' PRIZES.

In addition to the President's Gold Medal the Council offers three prizes of a cash value of twenty-five dollars each for the best papers contributed by Canadian mining students on the following subjects:—

GROUP I.—ORE DEPOSITS AND MINING GEOLOGY.—The subject may be treated generally, or some particular district or single deposit may be discussed or described.

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GROUP III.—ORE DRESSING AND METALLURGY—Any branch of ore dressing or metallurgy may be treated, as for example—crushing, jigging, milling, concentrating, smelting, roasting, cyaniding, etc., or some particular plant may be described or discussed.

Competitors must advise the titles of their subjects to the Acting Secretary of the Institute not later than the 15th February next and MSS. must be sent to him on or before the opening session of the meeting on the 1st of March.

SYLLABUS OF PAPERS.

Syllabus, embracing a large number of papers presented by the members, and detailed programme of arrangements for these meetings will be mailed to members in due course.

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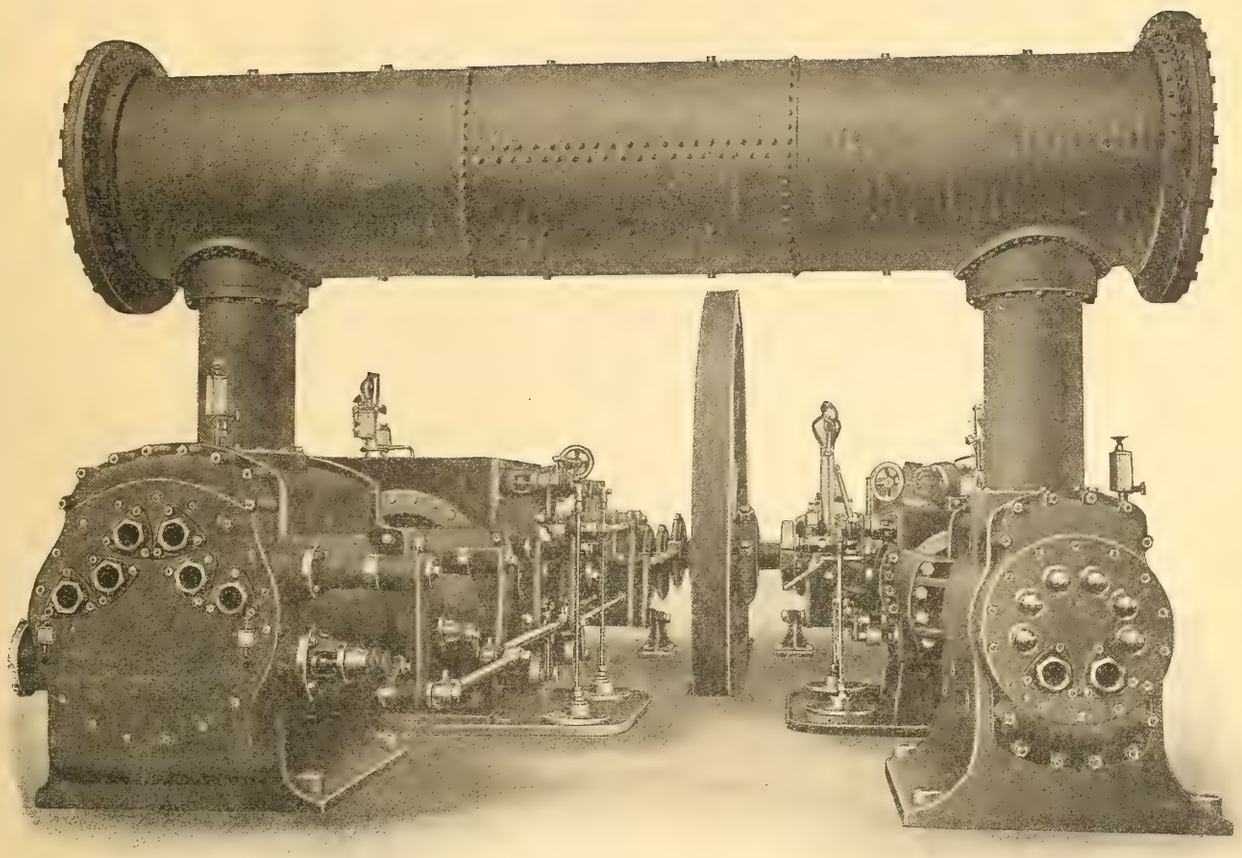

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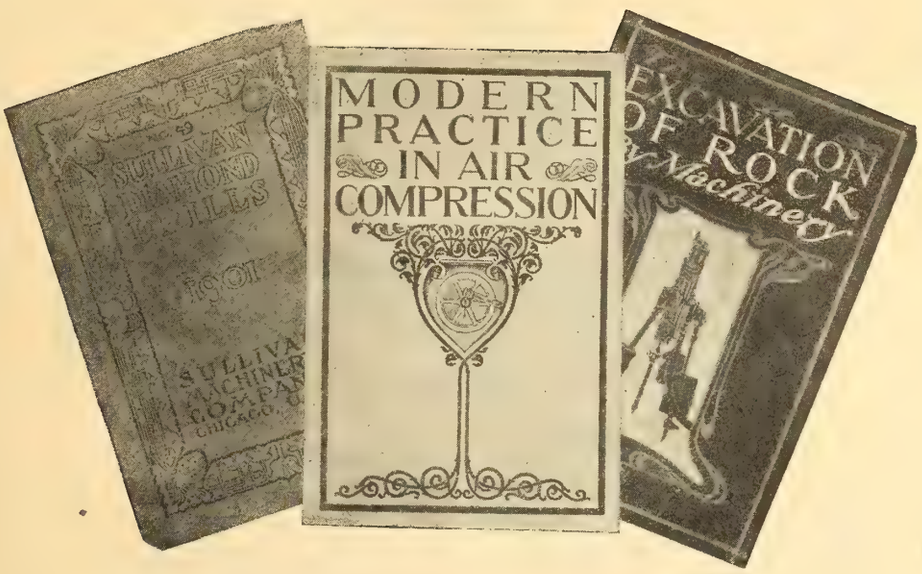
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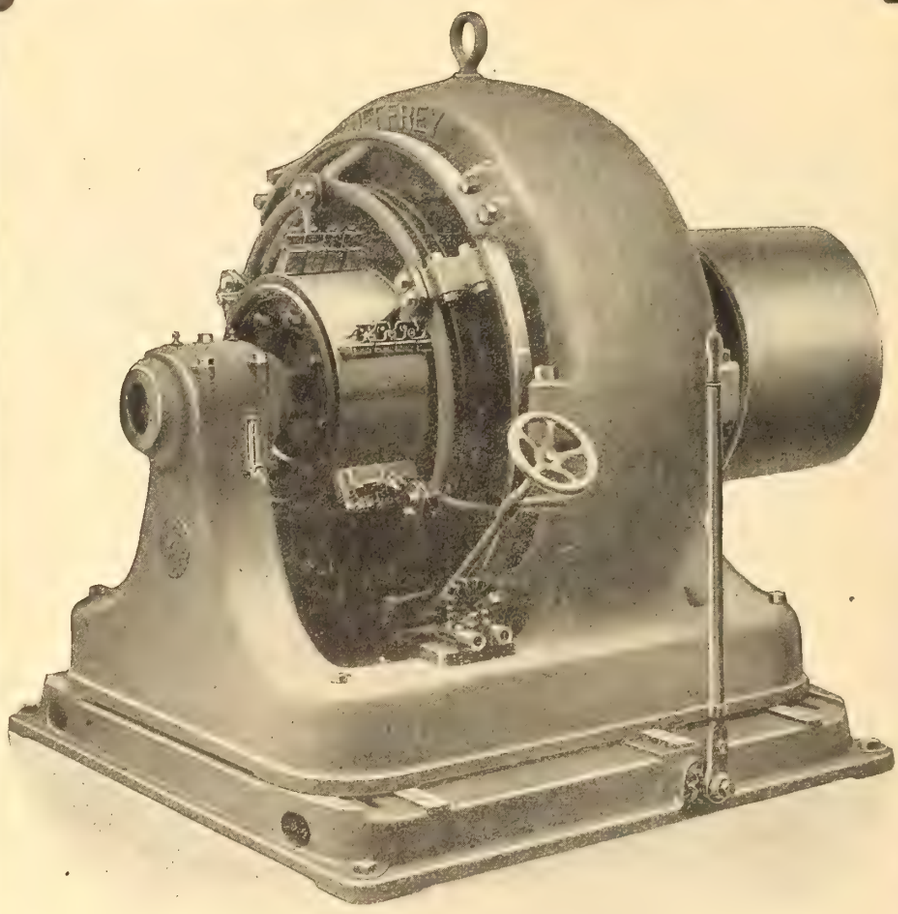

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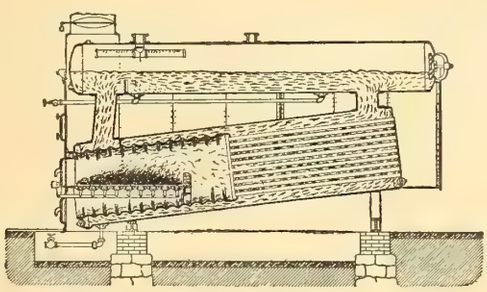

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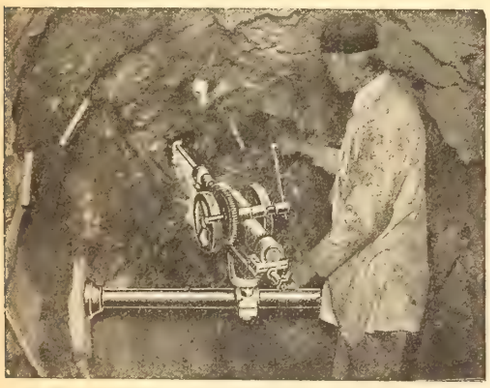

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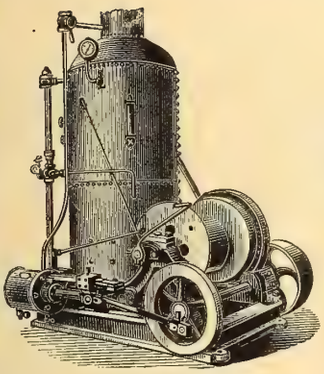

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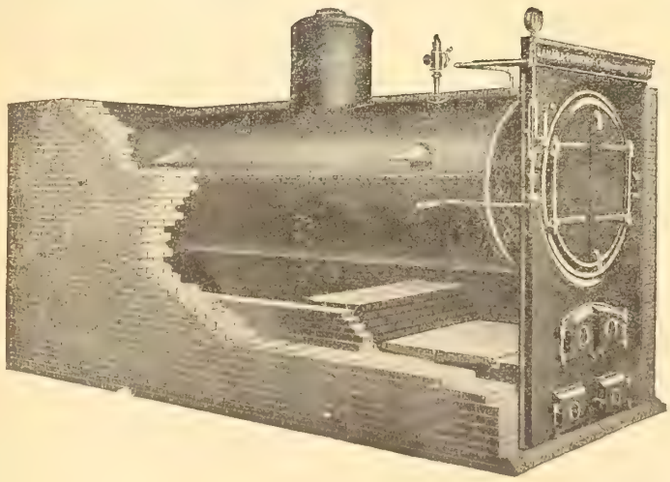

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VOL. XXIV—No. 1. MONTREAL, JANUARY, 1905. $3.00 per year. 25 cents per copy.

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The official announcement of the seventh annual meeting of the Canadian Mining Institute, to be held in Montreal on the first, second and third days of March appears in our advertising columns this month.

The executive of the Canadian Mining Institute have announced the prize winners for the papers read at the last annual meeting. The President's gold medal has been awarded to Mr. C. W. Knight, Queen's University, for his paper on "Notes on Some Deposits in the Eastern Ontario Clay Belt." The Institute money prizes of $25 each were awarded to E. J. Carlyle of McGill University, Montreal, for a paper on "The Pioneer Iron Mine, Ely, Minn.;" E. T. Caskill, Queen's University, Kingston, for a paper on "Notes on the Occurrence, Production and Uses of Mica," and Mr. J. F. Hamilton, School of Practical Science, Toronto, for a paper on "The Relative Attraction of Some Common Minerals for Residuum Oil."

A gentleman who has recently travelled through South Africa says that the mining of base metals and of coal is now attracting much attention. Several large deposits of good grade hematite have been consolidated and London capital received for their development. The discoveries of tin are not yet vouched as being of commercial value, though development may change present views. Copper ores are known to exist, but the market does not warrant their development. Much of an advance has, however, been scored for the coal trade by the opening up of new seams in the Barberton, Middleburg and Petersburg districts, which are reported of unusual thickness and of good quality.

Canadian Mining in 1904.

The year which has just closed did not occasion any material advance in the production of minerals in Canada, but witnessed some reconstructions and changes in methods which have already borne fruit in increased outputs and decreased costs. This was most noticeable in Eastern Canada, but was nevertheless true of British Columbia. We propose to briefly note the most important events, leaving the details to our next issue.

In Nova Scotia the event which will probably outweigh (in financial magnitude) all others, was the beginning of a self-supporting career for the Dominion Iron and Steel Co. Under the able financial supervision of Mr. J. H. Plummer, the President, and the yet more valuable technical direction of Mr. Graham Fraser, as Director of Works, the chimerical and visionary policy of preceding managements was laid aside, and the corporation started in to do the work which lay ready for it. The skilled brain of Mr. Fraser grasped the potent facts that the Canadian market would buy billets, rods and special shapes, but would not take structural material in sufficient quantity to make operation profitable; therefore a remodelling took place. To-day the demand for wire rods is great, and the company is earning profits which take care of all fixed charges and will shortly permit the payment of interest on the preferred shares. The common shares will wait, perhaps for some years, before their value is anything but speculative.

The completion of the single stack of the Nova Scotia Steel and Coal Co. at North Sydney, in August last, and its subsequent successful operation is another noteworthy event.

The N. S. gold fields showed a diminished production, but the year noted the introduction of several plants for the

recovery of the values hitherto lost in metallic sulphides; whether the cyanide method will produce satisfactory extraction of these values is questioned by some chemists, but the effort is in the right direction.

In Quebec there was little to note except the abandonment of attempts to work the iron sands of the Lower St. Lawrence River, and the discovery of a valuable mineral section, carrying ores of iron, copper and gold, as well as asbestos, in the northern region which will be traversed by the Grand Trunk Pacific.

In Ontario the chief event was the resumption of active operations at the Sault by the Lake Superior Corporation, and an adjustment of the financial obligations of the old company. The successful manufacture of steel rails from imported pig was accomplished in the last quarter of the year, and there is hope that the iron manufacturing end of the huge aggregation will be permanently profitable. Several of the subsidiary companies have not yet resumed active operations, and some of them will doubtless be dropped from the chain formed some years ago by Mr. F. H. Clergue.

The exploitation of the new mineral region round Haileybury and Lake Temagami has shown the occurrence in commercial quantities of native silver, ores of cobalt, pyrrhotites carrying nickel, and the promise of iron ores. The new district is bound to become an important factor of the mineral wealth of Ontario.

The gold fields of Western Ontario have not made any material output, but have remained in the obscurity which befell them some three years ago, yet in individual cases substantial improvements and progress are recorded.

For British Columbia it may truthfully be said that the year has witnessed an increase of legitimate work, an increase in production and probably an increase in profits. The bounty on lead stimulated the Slocan and East Kootenay sections and their production has been much increased.

In Rossland Camp there was no increase of output, the year's tonnage being 342,324 tons valued at $4,400,000, an average of $12.88 per ton. The camp has been agitated (as ever) by schemes for amalgamation of properties, reconstruction, etc., etc. A short time now will probably witness the announcement of the success of the Waterlow effort to consolidate the chief producers of the Camp, with the addition of two or three small Boundary properties.

The Boundary district has gone steadily ahead, and has greatly increased its shipments, closing the year with a record of 810,000 tons of which the Granby Consolidated Mining and Smelting Company alone treated 570,000 tons. The transfer of the Granby Consolidated to American interests, accomplished during the summer, is the most noteworthy occurrence during the year for British Columbia. The market troubles of the promoters of the Montreal and Boston have not yet (apparently) had any effect upon the mines or furnaces of that corporation, and need not necessarily. Some of the claims aggregated are valuable and some are not, but the valuable ones are apparently sufficient to produce a dividend on the large capital of the aggregation.

The Slocan also experienced a decided revival of interest and production. The shipment of zinc ores (concentrates and lump) began as a regular industry. The introduction of the leasing system is noted in an independent article.

The Lardeau district had its best year in 1904; the Silver Cup, Nettie L. and Triune have all done well; the gold section of Poplar Creek yet requires time and better management before a responsible verdict can be given.

The Yukon has had no special feature beyond the voluntary abandonment of the so-called "Tredgold Concession," which occurred in midsummer; its production was about $10,000,000.

Taken all in all the year 1904 witnessed a realization of the value of Canadian mining, which had been previously doubted owing to the violent sickness of the mining share market. It is not optimistic to say that 1905 will show still further recuperation from the despair of 1902; and the only deterrent feature in sight is the incompetency of some of the managements in charge of producing properties.

The Leasing System in West Kootenay.

The leasing of mining properties on a royalty basis is rapidly spreading in West Kootenay with satisfactory results. Hitherto the system has prevailed chiefly in the Slocan to which it is especially adapted in consequence of the large number of small properties in that Division and the high grade character of the ore. During the present season leased mines have contributed a considerable tonnage to the output of the district, and next season will see an increase. The lease of the *Enterprise* has been carried on with success, and the *Chapleau*, on which an English company spent $150,000, and which has been shut down for two years, has just started again by the owners of the adjoining *Kilo*, on a 20 per cent. royalty.

In the Ymir district the *Queen* property has been operated under a lease by Mr. W. H. Waldie, who has done so well (bringing down a brick every month worth from $3,000 to $5,000) that he is likely to arrange for the purchase of the property. The *Kootenay Belle* and adjoining claims, belonging to Mr. Thomas Bennett, were leased three months ago to the Bell Bros., who are working vigorously and sharing with Mr. Waldie the use of the Yellowstone Mill. The *Kootenay Belle* is a free milling property of promise, and the outcome of the present lease may be a consolidation of the three properties and the ultimate development of a large mine.

The pioneer of leasing in Kootenay, Mr. M. S. Davys, who ran the Silver King in 1903 and 1904 with such splendid results, has recently returned from London where he met the directors of the Hall Mines and concluded an arrangement to operate the mine as lessee on a half profit basis. This is a satisfactory arrangement for the shareholders who must have cast longing eyes towards the handsome profits which Mr. Davys made during the last financial year.

Altogether there can be no doubt that the system of leasing is working well in the district and keeping many properties in

operation which would otherwise be idle. It is also a gratifying feature that the local men, who have little capital but have stood by the country for years, are thus enabled to reap the benefit of their experience and perseverance.

The Rossland Power Company's New Plant.

Early in December the western mining community were startled, though not greatly surprised, to learn that the extensive new plant of the Rossland Power Co., erected at Trail at a cost of $300,000, had been closed down indefinitely after a run of a few weeks, and that Mr. Kirby's resignation as general manager of the War Eagle and Centre Star Mining companies had followed.

Whether the former accounts for the latter, or whether, as is firmly believed in well informed circles, Mr. Kirby's resignation results from his determined opposition to the Snow Shoe amalgamation, will be known later, but such a course is the only one which would be expected of a man of Mr. Kirby's integrity.

In this connection the transference of Mr. James Cronin, Mr. T. G. Blackstock's "fidus achates," to Rossland and his active participation in the control there is significant. No doubt later developments will clear up this point. Meanwhile the failure of the large concentrating and cyaniding plant at Trail is a matter of great moment and seriousness to the community.

It was hoped that this plant, the result of five years' study of Rossland ores, would solve the problem of extracting the values which have hitherto been lost, and so convert this camp into one of the most profitable in the West. Laboratory tests promised this result, but experience has again proved how wide is the difference between experiment and practice.

The management has not been slow to state the reason for its drastic action in closing down. Briefly summarized, the explanation is, that the mill has been engaged for several weeks on a trial run; the process comprises the two standard operations of coarse concentration on jigs and tables and cyanide treatment of the tailings. These tailings, below a quarter of an inch in size, were pulverized in Chilian mills to about 50 mesh. The test runs made developed the fact that the coarse concentrates, although otherwise of excellent quality, were surprisingly low in grade, and under the smelter rates prevailing yielded no profit. The reason given for this is that the finely disseminated sulphides remaining with the jig tailings were of very much higher grade than the larger particles and contained the bulk of the values. This unexpected peculiarity of the ore impoverished the coarse concentrates and carried the high grade sulphides, $100 to $200 per ton, into the cyanide tanks where successful extraction was impossible.

It has, therefore, become necessary to add a plant of concentrating tables to treat the pulverized product from the Chilian mills before it goes to the cyanide plant, and thus to extract the rich sulphide contents for other treatment. It will require several months to secure and install these tables and make some additions to the slime-settling facilities which have been found necessary and desirable. It has, therefore, been decided to suspend operations until these improvements have been made.

To this may be added the following facts:—The mill is built on a bench 200 feet above the Columbia River, and not until after construction was it discovered that to bring water from that river, which is the only adequate source of supply, would require the construction of a flume more than 20 miles long from a point above Robson. An attempt was made to obtain a water supply from Rocky Creek, which was found to be inadequate and which retarded the commencement of operations. Finally, a flume was constructed, at great expense, from Murphy Creek which brought an abundance of water to prove that the plant was a failure. During the trial run we are informed that 32 tons of water were used to the ton of ore treated.

In consequence of the internal arrangement of the mill all the ore has to be twice elevated by mechanical appliances, which involve extensive machinery which absorbs a large proportion of the power available. Gravitation is not resorted to except in the actual process of concentration.

Reports show that much remains to be done before this plant will do the work for which it was designed, if, indeed, the fundamental errors of location and construction can be overcome, and if this is the final result of five years' experimenting with, and study of, Rossland ores one may fairly doubt whether that camp is within measurable distance of a solution of the problem of extracting values. One reflection suggests itself, viz,: that Mr. Hopkins, the English expert who directed the company's experiments with the Pellatan-Clerici process for more than two years before it was abandoned for the now discredited Elmore process, advised that water concentration would carry the high grade sulphides into the cyanide vats and so destroy the efficiency of the process. Mr. Hopkins was "let out" and the company proceeded with its plans, and expenditure. To-day the former seems to have been justified in his opinion.

The Payne Mine.

The closing down of the Payne Mine is the most serious set back that the mining industry of the Kootenays has sustained since a similar fate overtook the War Eagle nearly four years ago. Fortunately, the latter soon resumed operations, though on a more limited scale; whether the same course will be followed by the Payne remains to be seen.

For a long time the Payne was the banner mine, not only of the Slocan, but of the Kootenays. It was the pioneer of silver lead production on a large scale, and before the Rossland camp had produced to attract attention, the Payne was already making shipments and paying dividends. This continued until 1900, when the reserves in the upper level were

exhausted, and, as development work had been neglected and all the profits distributed in dividends, there were no reserves on which to fall back. The mine was closed, to the disappointment of the public and the great loss of the shareholders, many of whom were comparatively poor people who had invested because they regarded the mine as a permanent source of income.

In 1901 Montreal capitalists came to the rescue and carried through a scheme of re-organization which provided adequate funds, if wisely expended, to re-habilitate the property and place it on a paying basis. During the last three years some $500,000 have been expended and now the mine is closed down, with no ore reserves in sight and a general indebtedness of $100,000, which includes $42,000 to the Bank of Montreal. This is a lamentable fiasco, and especially disastrous in view of the increased price now offered for lead, the market just opening for zinc, and the assistance given to the industry by the Government bonus, a large portion of which should have gone into the pockets of the Payne shareholders.

In view of the importance of the position of affairs detailed above, our correspondent has investigated the matter on the spot, and, in the light of the information available, concludes that there has been inexcusable neglect on the part of the directors in failing to keep in touch with the actual condition of affairs, either through the medium of a competent and independent consulting engineer, or an experienced and practical managing director. The lack of this precaution has led to a repetition of the series of blunders which have characterized the careers of many mining companies in British Columbia. A large mill and concentrator and a zinc separator have been erected, costing from $250,000 to $300,000, only to find that there is no ore ready for treatment. The small tonnage passed through from development work could not be treated economically, costing more to concentrate than the values realized by the process.

One half the above amount, spent on intelligent development work, would have effectually demonstrated whether or not pay ore existed at greater depth; the lowest level driven is at 800 feet and here the values have disappeared.

By way of contrast in methods it may be noted that, at the Rambler Caribou a tunnel is being driven 4,000 feet to cut the vein at nearly 2,000 feet in depth. It will take two years to complete that tunnel and will cost $75,000. Meanwhile, it is a matter of patience and steady outgo with no income, but it is legitimate mining and in the end will pay the shareholders and the district.

It is impossible to believe that the Payne will not start up again sooner or later, but meanwhile another blow has been struck at mining investment in the Kootenays, and since the worst has happened we, in common with all who have the true interests of the district at heart, hope that its resuscitation may be later rather than sooner, unless its third career is to be conducted on better principles, with a disregard for the stock market, and in pursuance of an enlightened policy based on the development of ore bodies as the first essential of successful mining.

CORRESPONDENCE.

Mining Schools.

To the Editor,—

Sir:—

Some months ago a movement was made in several of the American Mining schools towards buying a mine to be operated and used as a practical training in conjunction with the academic courses. It is understood that they leased a mine in Colorado for this purpose, and time will show how well it has fared with them.

The Mining College of Washington State University has now undertaken to operate an abandoned mine at Index, Snohomish County.

Generally speaking, these attempts to increase practical training within the course of study have been commended by the mining journals. THE CANADIAN MINING REVIEW itself has come forward with a suggestion of the kind for the three principal mining schools of Canada. It is rightly recognized that a degree in a mining course may still cover a lamentable ignorance of mining conditions. The usual cure for this is a hard few years in mining camps, after graduation.

An enterprising student, ready to take the mining industry as his vocation need hardly wait until graduation for some practical experience; aside from the University mines he can get employment at some rough work, where he can learn much of men and manners and mining, which will make his feet feel more sure when he leaves the shelter of the academic home. As a student he can do work, which becomes his position at that stage, such work as might set him back at a later stage, also he is usually well received and given a show by mine managers, if he exhibits a proper spirit. At this time he gains a local knowledge and affiliations with mining industry which no university mine in its academic isolation can give him.

If the railways, so generous in their treatment of the public at holiday times, and of the training of engineers in their own branches at McGill, would give science students facilities within their means of reaching outside work for the summer, they would greatly benefit the men who are creating industry.

For our own part, the students themselves show a commendable enterprise in going out to far away points for summer work. The experience is invaluable, but transportation leaves little to help them on through the next session. In British Columbia and Alberta last summer there were a large number of Eastern students, working on D.L.S. surveys, irrigation surveys, and in the mines of Rossland, Slocan and Boundary; others, in the mineral districts of Ontario and the Nickel-Colbalt country near Lake Temiskaming.

This is a better condition than ten years ago when the few mining graduates of the eastern colleges went like tenderfeet into the mining districts where no great favor was shown to college men.

The Provincial Government of Ontario has generously assisted the training of engineers and provided mills for their instruction and the benefit of the mining community of the province. The latter is a point sometimes lost sight of because the results of tests made for individuals are not, and cannot, be published abroad.

The mills, however, exist and are running on good work each year for six months; to obtain ores for this purpose, very reasonable rates are given, rates far below the actual value of the work done.

The Canadian Pacific Railway Co. has given a reduced rate upon such shipments for testing purposes, so that it has become quite possible to treat small lots of British Columbia ore. Some of these, especially the dry ores of gold and silver offer a very good field for testing. At the Kingston School of Mining, each year, ores suitable for testing in the matter of free milling, cynidation, etc., are treated before Christmas; those for concentration after Christmas. The tests are usually on a considerable quantity so that besides affording solid instruction, the metals or concentrates saved are a commercial quantity and more than pay for the tests in some cases.

It is right that people should know that such work is being done to the mutual advantage of the students and the miner, and that the country is getting back something of value in trained men, and mill tests, for the support given.

During the past two years these tests have been more in the mill than the laboratory, that is they have been made with conditions of commercial magnitude, not with models.

Free milling and other treatment has been applied to gold ores from Jack Lake in north-western Ontario, and from discoveries north of Sault Ste. Marie. Various leaching processes have been used upon dry gold-silver ores from British Columbia. Magnetic separation has been used on iron ores from Quebec for the elimination of titanium and on the flue dust of the Hamilton Furnace Co. Concentration tests with various classifiers and oil upon ores from British Columbia and on molybedenite and graphite from Eastern Ontario.

Jig and table concentration on considerable lots of zinc and lead ore from Frontenac County.

A considerable amount of work has also been done by the Mineralogy Department on the new Nickle Colbalt ores of Temiskaming.

Yours truly,

J. C. GWILLIM.

Kingston, January 3rd, 1905.

[Prof. Gwillim's letter opens an inviting vista for discussion of the curriculum adopted in our Mining Schools, and of the lines of practical work done or attempted in the summer schools after the close of the regular session. The REVIEW has asked some of the professors in other mining schools to give our readers the benefit of their views, and herewith extends an invitation to engineers, who are not professors, to use the columns for any contribution to the subject they desire to submit.—EDITOR.]

The Centre Star Mine.*

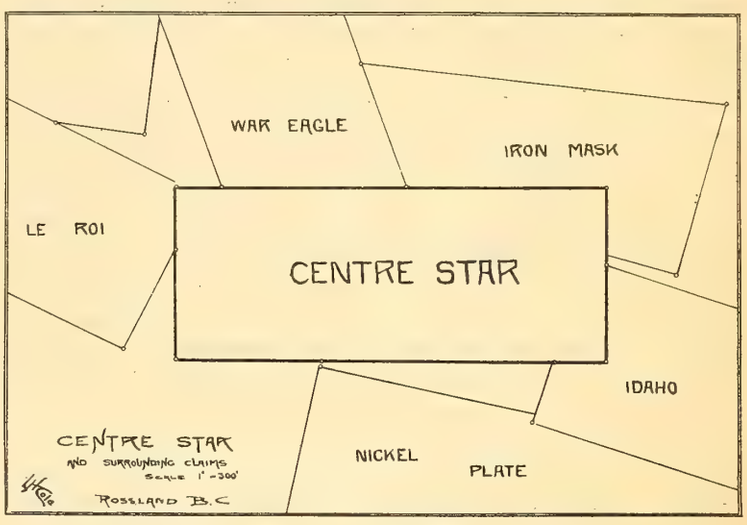
By L. HEBER COLE.

The Centre Star Mine at Rossland, B.C., is located on the slopes of Red Mountain to the north-west of the city. It is bounded on the west by the Le Roi Mineral Claim, on the north-west by the War Eagle and Iron Mask Claims, the north-east by the Idaho and to the south-east by the Nickel Plate Claim.

It is full sized, 1,500 ft. long by 600 ft. wide and was located in 1890.

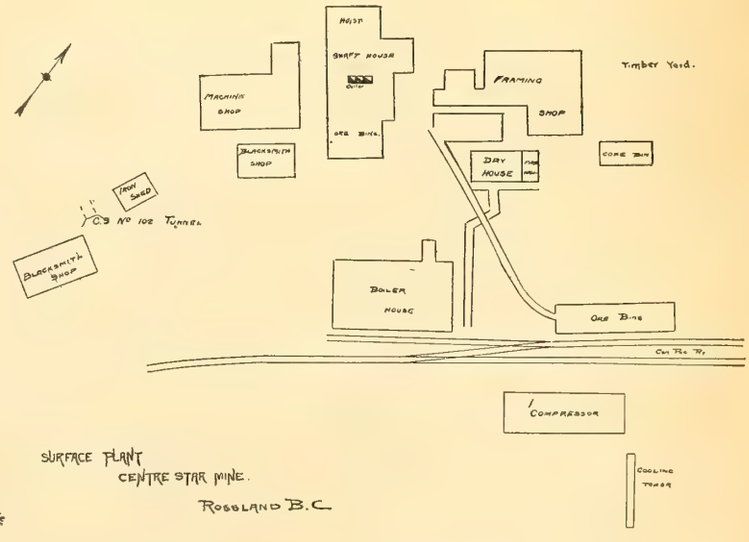
The ore of this mine consists of iron and copper sulphides (pyrrhotite, chalcopyrite, and pyrite, accompanied by arsenopyrite). The principal value is in gold, which is chiefly carried by the chalcopyrite, but the copper makes an important addition, and there is always a small amount of silver present.

The veins vary in width from a few inches to 40 or 50 feet, and the pay shutes in some cases extend from wall to wall, while in others, only parts of the veins are enriched. Sometimes the walls are very indistinct and the values run into the country and gradually decrease without any sharp line of division between ore and country.



The mine consists of several veins, either extensions from bordering claims or else veins starting in the claim itself. The main Centre Star vein, however, and the one in which most of the work is done, is the large Shear Zone Fissure consisting of parallel platings of the rock produced by shearing under high compression. This vein runs along the southern slope of Red Mountain and appears in the Le Roi Mine; it has a dip varying from 60 degrees to 70 degrees and a strike that is approximately N. 68 E. It varies greatly in width and is cut by a large number of dykes and faults.

As the Centre Star and War Eagle Mines are under the same management, the offices are placed so as to be convenient to both. The office building, besides containing rooms for the general office work, has draughting rooms, blue print room, photographic dark room, surveyor's instrument room, and the private offices of the general manager and superintendent. The assay office is conveniently near the main office.



The collar of the main shaft is located 500 feet from the west end line and 225 feet from the north side line of the

*Abstract of a paper read before the Miuing Section of the Canadian Society of Civil Engineers.

claim. Over this shaft, is erected the shaft house. The hoisting engines are contained in a room on the hanging wall side of this building, while the back part of the shaft is occupied with ore bins.

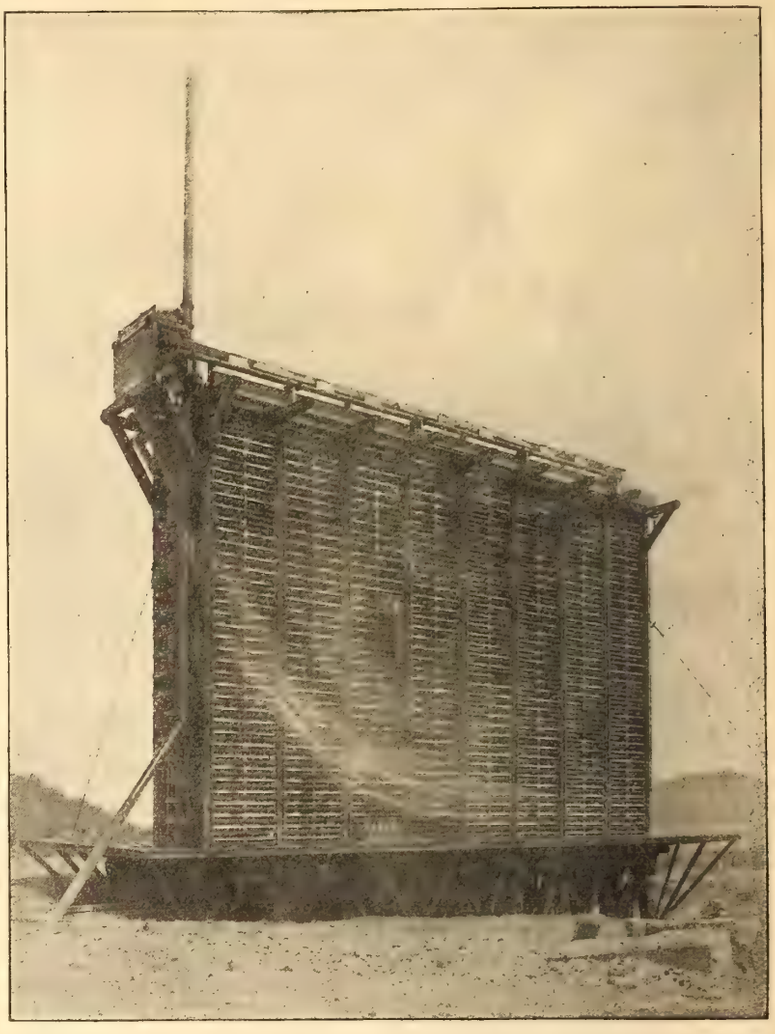
The machinery for the machine and timber framing shops, is driven by a 100 H.P. cross compound automatic cut-off Ball engine. The line shaft is fitted with friction clutches so that each shop can be operated independently. The equipment of the machine shop consists of one 28 inch swing and one 16 inch American Tool Company's lathes; one 26 by 36 inch American Tool Company's planer; one 36 inch Barnes upright drill and one post radial drill. There are also two pipe machines with a capacity to cut from ¼ to 8 inch pipe, and a bolt cutter to cut from ¼ to 2 inch bolts. The whole is served with a three ton travelling crane. About one-third of the shop is devoted to the repairing of rock drills. The machine shop is fitted with steam, water, compressed air and electricity for testing and repairing. Beyond the machine shop is the blacksmith shop. Here the sharpening of the machine drill steel is accomplished by a machine drill-sharpener. There are three men operating this machine; besides these, two blacksmiths and their helpers are kept employed on general construction and repair work for both mines. The drill steel for both the War Eagle and Centre Star Mines is sharpened by the one machine.

Adjoining the shaft house and connected with it by two tram-car tracks is a 40 by 70 foot mill devoted exclusively to the framing of mine timbers, having the latest appliances for framing square sets and shaft timbers by power. This timber framing machinery was built by the Denver Engineering Works. A 48 inch swinging crosscut and a rip saw complete the equipment, which gives ample facilities for supplying the mine with correctly framed timbers in the least time and most economical manner.

The War Eagle and Centre Star hoists and Centre Star compressor are all supplied with steam from the Centre Star boilerhouse, which contains four horizontal tubular boilers (5 ft. by 15 ft.) of 100 H.P. each, carrying a steam pressure of 100 pounds, and three (88 in. by 16 ft.) Scotch marine high pressure boilers carrying a steam pressure of 130 pounds and having a capacity of 175 H.P. each. The fuel used is Crow's Nest Pass coal.

Compressed air is supplied to the mine by a Canadian Rand Drill Company's cross compound, condensing, two stage, air compressor of 40 drill capacity. When running at its maximum speed of 70 revolutions per minute, it consumes 625 H.P. and delivers 3,960 cubic feet of free air per minute. The steam cylinders are 22 in. by 48 in. and 40 in. by 48 in., and the air cylinders are 22 in. by 48 in. and 30 in. by 48 in. The circulating water for the condenser is cooled after leaving the condenser, by means of a cooling tower, located 100 feet away. This tower is 25 ft. high and 40 ft. long. The circulating water is forced to the top by means of a single acting Worthington, triplex, power pump belted direct from the main shaft of the compressor. The water flows in thin layers over the shutters of the tower, and in so doing, presents a very large superficial area to the direct cooling contact of the air. From the cooling tower, the water returns by gravity to a settling tank, from which it is again handled through the condenser and around the same cycle by means of the pump. The condenser is of the Wheeler Admiralty surface type. All Centre Star and War Eagle compressors discharge into a common system so that any or all compressors can be used in the running of either mine.

Prospecting.—Prospecting and development were started in the usual manner on the Centre Star Claim. The veins were exposed by surface stripping in several places and prospecting shafts were sunk on the veins. Two tunnels were run in on the ore, and from these tunnels, prospecting proceeded by



Cooling Tower.

means of crosscuts, drifts, winzes and raises; when it was considered that the mine was sufficiently proven, the main shaft was sunk. Work on this shaft proceeded at three different points simultaneously, viz.: sinking from the surface, raising from the second level, and sinking from the second level; the mine is now worked entirely through this main shaft. The collar of the shaft is 3,688 feet above sea level. The shaft has a dip of 70 deg. and its direction is N. 38 deg. 49 min. W. There are three compartments, two of which are used for skips, while the third is used for a man-way and for the ventilation and compressed air pipes. Each compartment is five feet square, inside measurement. From this shaft eight levels are worked, varying from 125 feet to 175 feet apart on the slope.

At each level a large station is blasted out so as to handle the ore into the skips through large pockets. These are made so that by opening a gate at the bottom, the ore is allowed to shoot straight into the skips by gravity. From the station, crosscuts and drifts have been run in different directions to locate and work the ore bodies.

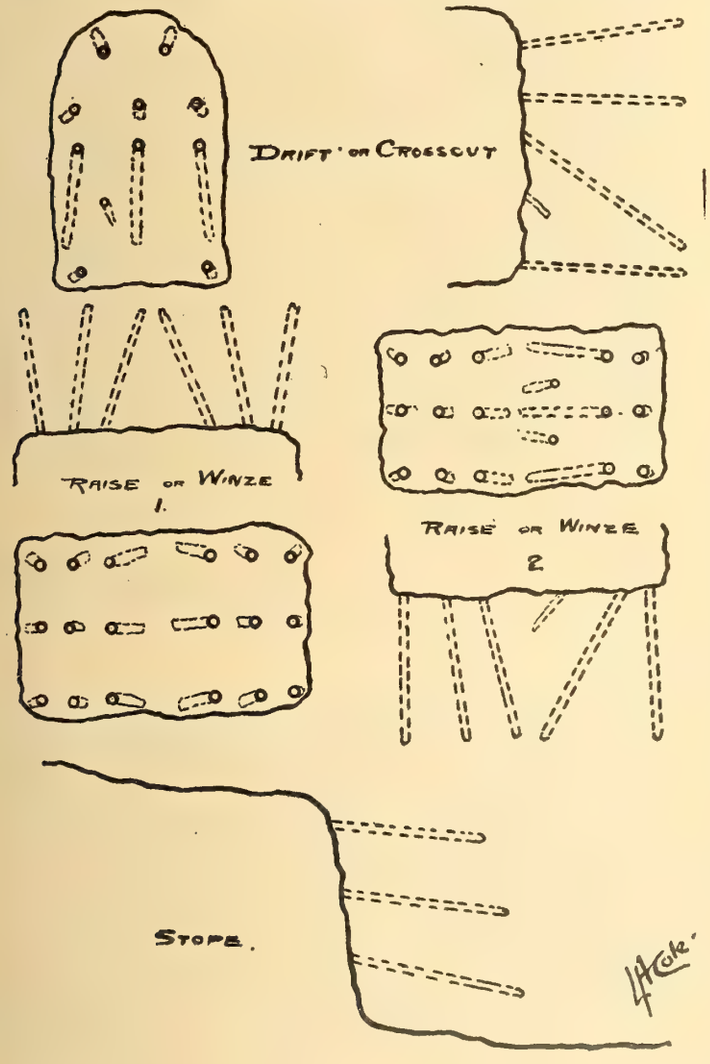
Drifting.—Where possible, the drifts are driven along the foot wall. Since the rock is extremely hard no timbering is required.

The average advance per round of holes is 4.5 ft., working one machine for two shifts per day. The total advance for a month varies from 70 ft. to 100 ft.; the grade of the drift is 7/8 of 1 per cent. Drifting is always kept well in advance of ore extraction.

The raises are put in at irregular distances along the drifts, and are usually of two compartments, one a man-way and the other an ore chute.

Diamond Drill Work.—Two sizes of drills are used, one of 1 3/8 in. core diameter, and the other with 15-16 in. core diameter. The machines are seldom used for boring over three hundred feet.

In starting the drill, especially for those drifts in which tramming is carried on, a short crosscut is first blasted out to give room for operating the machine without interfering with other work. The rods are square threaded and are in 5 ft. lengths; they are pulled in 5 ft. to 10 ft. lengths, according to the space available behind the drill. The average length of



Sketch showing position of holes drilled for breaking ground

Rossland B.C. CENTRE STAR MINE.

the core pieces saved is from 5 inches to 8 inches, but often the full length of the core barrel is kept intact.

The drill engines are screw fed, and fitted for 300, 700 and 1,000 revolutions per inch of advance. Their ordinary speed is 300 r. p. m. with a maximum of 1,500 r. p. m. The water is pumped through the drill rods by a small independent force pump run by compressed air. In an eight hour shift, the average progress made is about 10 ft.

Since the rock in which the drilling is carried on is very hard, the bits require to be reset frequently, each bit drilling about 12 ft. before resetting is necessary.

If the drill hole is not deep, the rods are pulled by hand, but if 200 ft. or so the work is too severe, and a drum is then used on which is coiled the wire rope.

The core, after it has been examined and sampled, is placed in trays and put on shelves in the core-house for future reference.

Narrow Stopes.—A large part of the workings consist of narrow stopes less than 15 ft. wide. Having carried up the raise a sufficient height, stoping begins at the lowest limits of the pay ore and the stope is driven to the boundary of the pay chute. Round stulls are used and a close floor of lagging is spiked on the stulls; stoping above the floor then commences.

The broken ore is kept close up to the face so as to have a good footing for the machine men.

When the pay ore begins just above the drift, a raise is not kept in advance of the stoping, since the whole back is worked as a stope. In this case, there is a permanent tight floor left above the drift.

Wide Stopes.—For stopes of a width greater than 15 ft. square sets take the place of stulls. The length and breadth of the ore body is first determined and the sill floor laid down. Breaking down the ore from the back is then started. Enough space is always excavated above the last floor to leave room for drilling the back. For a change of width in the ore body, the stope is extended by attacking the hanging or foot wall, or by leaving out as many sets as is necessary, according as the vein widens or narrows.

Drills Used.—Most of the drills used are of 3¼ inch diameter, and 6 inch stroke—Rand drills of the Little Giant type. They are set up, where possible, on drifting columns, which can be braced to the sides of the drift or to the floor and the back. Where the use of a column is impossible, a tripod is used.

Cross bits are welded to round shanks, which vary in length from 18 inches to 10 feet. One shift of eight hours dulls about thirty bits to each machine.

A round of holes for drifting in this mine generally consists of ten holes arranged as follows:—

Two back holes, three break holes, three cut holes, two lifters.

If the work is heavy a couple more holes may be added, one more lifter and one more back hole. The length of the holes varies from 5 ft. to 7 ft.

The back holes are inclined at an angle of about thirty degrees to the horizontal.

The next row of holes, called breast holes, is drilled slightly off the horizontal, just enough to hold water. They break down the portion immediately below the rock in which the back holes are placed, so as to relieve these upper holes.

Below the breast holes is another row, called cut holes, placed so as to run down at about an angle of about forty-five degrees; they remove the central portion of the rock so as to allow the other holes to break well.

The two bottom holes or lifters are drilled in at an incline downwards so as to form a wedge with the cut holes. Their object is to keep the floor on a level.

The side holes in each row are inclined either to the left or to the right according to the side they are on, in order to keep the walls at an even distance apart. Where the drift is re-

quired to turn either to left or right, all the holes are inclined in that direction.

For raises or winzes the holes are so placed that when the centre-cut holes are blasted, a free area is left for the other holes to break into. Eighteen holes is the usual number for a round, three in each line.

An exactly similar round is used for sinking, with the exception that the centre holes are inclined more towards each other so as to give more breaking power. The average length of the holes is from 6 ft. to 8 ft. For shaft sinking a great many more holes are used, as the area to be broken is generally larger.

The holes for stoping are placed so that the fullest breaking power of the charge can be utilized, and are placed horizontally in rows, one above the other. The higher holes are a little shorter, all are water holes.

When possible all blasting is done at night; the hours from 1 a.m. to 7 a.m. are set apart for this, and two men do the blasting for the whole mine. By this method the mine is free from gas and smoke for the morning shift.

The dynamite used is manufactured by the Hamilton Powder Company. The sticks are 1¼ inch and ⅞ inch in diameter, the former are of 40 per cent. and 50 per cent. strength, while the ⅞ inch is of 60 per cent.

The 60 per cent. powder is only used to break boulders, or whenever hand drilling is used for timbering holes.

The average charge for a drift round (10 to 12 holes) is from 90 to 100 sticks, or about 45 pounds.

The shortest fuse is timed to burn six minutes, giving the men time to get into safety.

In drifts, the cut holes are fired first, then the breast holes and lifters and last of all the back holes. In raises, etc., the centre holes are first fired, then the following rows in order.

Stope holes (horizontal) are fired one row at a time. The men then charge the next row above and fire that. They continue this until the whole round is blasted. Similarly in shaft sinking, the centre holes are blasted and the muck is cleaned out before the next row is fired.

Mucking.—When the working place is clear of smoke the mucking of the ore begins. The muck is loosened and shovelled into small cars which are trammed to the shaft station by men; no horses or mechanical labour are used underground, with the exception of on the second level.

Here a small station hoisting engine is used which pulls out eight cars at a time. It is impossible for this to be done by men as there is a heavy grade in the drift by reason of the drainage being towards the mouth of the tunnel.

The rails are of 16 lbs per yard, these are spiked to ties placed 2½ feet apart. Track laying is kept well up with the work.

The curving of all rails is done underground as required.

The car used stands 2 ft. 11½ inches from top to rails, and holds 16 cubic feet (approx. 1 ton).

Hoisting.—The main hoist in the mine was supplied by Webster, Camp & Lane, of Akron, Ohio. It has two drums, each 6 ft. by 3 ft. with a capacity of 1,700 ft. of round steel rope of ⅞ in. diameter. The average winding speed is 800 ft. per minute with a maximum of 1,000 ft. per minute.

The engines are 14 inch by 18 inch stroke with a Stevenson reversing gear. A Lane friction clutch is attached, permitting of either drum being run independently, so that hoisting may be carried on at the same time from different levels. The round rope is prevented from cutting the footwall timbers by rollers placed on the wall plates at intervals.

The skip runs on a 30 lb. steel rail spiked to the footwall plates of the shaft. The shaft guides are chiefly for safety purposes so that the safety clutches can grip them in case of accident.

The weight of the skip is .....2,400 lbs., and of the ore is 4,000 lbs., so that the 4,000

total weight hoisted, without rope, is.....6,400 lbs.

The skips haul with Humble detaching hooks, so that in the case of an overwind the rope is detached, and the skip hung in the head frame.

When a winze is being sunk, a small temporary hoist is generally used and the muck, etc., is hoisted in a bucket running on skids, it is dumped automatically into cars when it reaches the level.

Timbering.—On account of the solidity of the rock, timbering is not required in ordinary drifts and crosscuts: in stopes and raises, stulls and lagging are used extensively, but when the stope becomes too wide (15 ft. is about the limit) square sets are adopted; square timbers are also used in the shaft.

The timber is supplied to the mine as:—

Square Timber.—10 inch x 10 inch square by 16 ft. long.

Planks.—3 inch and 4 inch wide by 16 ft. long.

Stulls.—Logs varying in diameter from 10 inch to 25 inch with the bark removed, and cut into lengths of about 16 ft.

Lagging.—Small, round timber left in the rough, and in 16 ft. lengths. Tamarac is generally used.

Adjacent to the framing-shop and connected with it by tracks is a commodious timber yard. The timber is hauled along the road on the upper side of this yard, and from the waggons it is rolled down skids and piled, being brought into the framing shop on trucks. A swing-saw is used for cutting the timbers to the required lengths, and the spare timbers are framed by the timber-framing machine. From the framing-shop, the timbers are trammed to the collar of the shaft as needed. For lowering the timber into the mine the ordinary skips are generally replaced by a special timber skip.

In the shaft, the sets run at right angles to the dip, but in the square-set stopes the floors are laid level. On the other hand, in the narrower stopes, the stulls are placed approximately at right angles to the walls.

The timbers are firmly wedged into place by wooden wedges. On top of these is placed the lagging, so as to form a solid floor. The flooring used in the square sets is 3 inch and 4 inch planking.

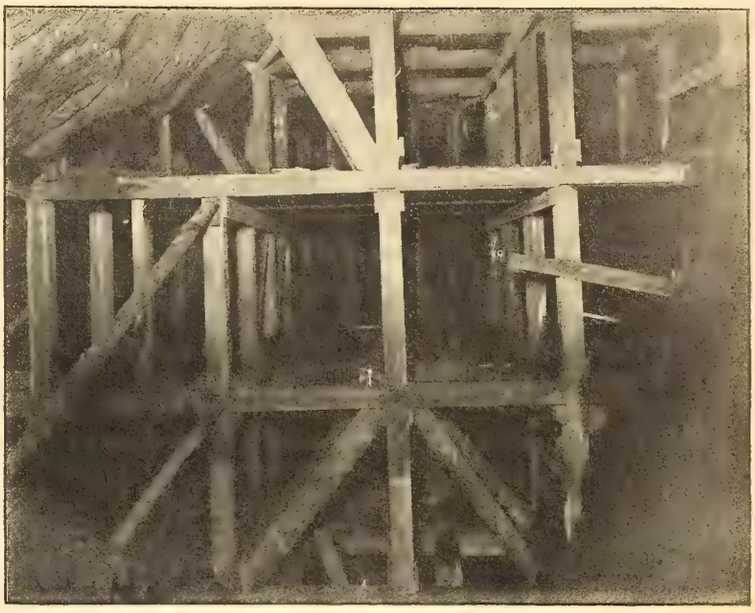
Pumping.—The water encountered is comparatively small in amount and is non-corrosive. Three pumps, one on the 4th level, another on the 8th level and the third in the sump of the shaft, are sufficient to cope with all the water.

A large new pump, to be run by electricity, is now being installed at the 6th level station. When in place, this pump will do the pumping for the whole mine.

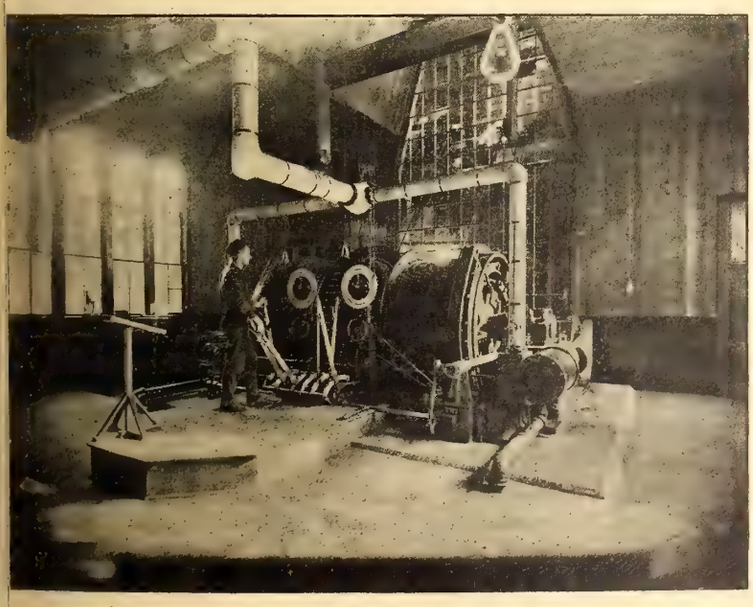
Ventilation.—The mine is provided with a No. 4 Root's blower, having a 14 inch delivery pipe. It runs about eight hours per day and supplies 150,000 cubic feet of air per hour. It is driven by 10 H.P. induction motor. The blower is reversible and can thus be used either to force fresh air into the mine or to exhaust the foul air.

There is more or less natural ventilation up and down the shaft, due to its connections with the tunnels. When stopes or raises extend from level to level, a certain amount of ventilation is secured, but when these are not completed artificial ventilation is required. Much time is saved by artificial ventilation as the smoke and poisonous gas, generated by the ex-

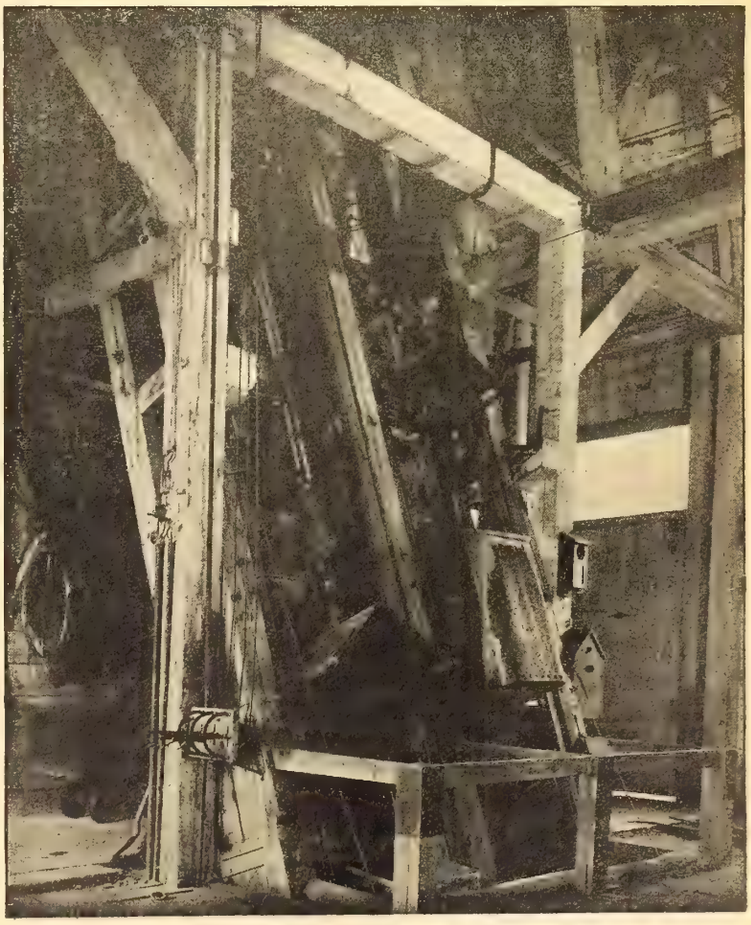
NARROW STOPE,
in which tripods are usually used at the Centre Star Mine.



SQUARE SET TIMBERING,
as placed in the side stopes of the Centre Star Mine.



THE HOISTING ENGINE
of the Centre Star Mine.



VIEW OF THE COLLAR OF THE MAIN SHAFT
of the Centre Star Mine.

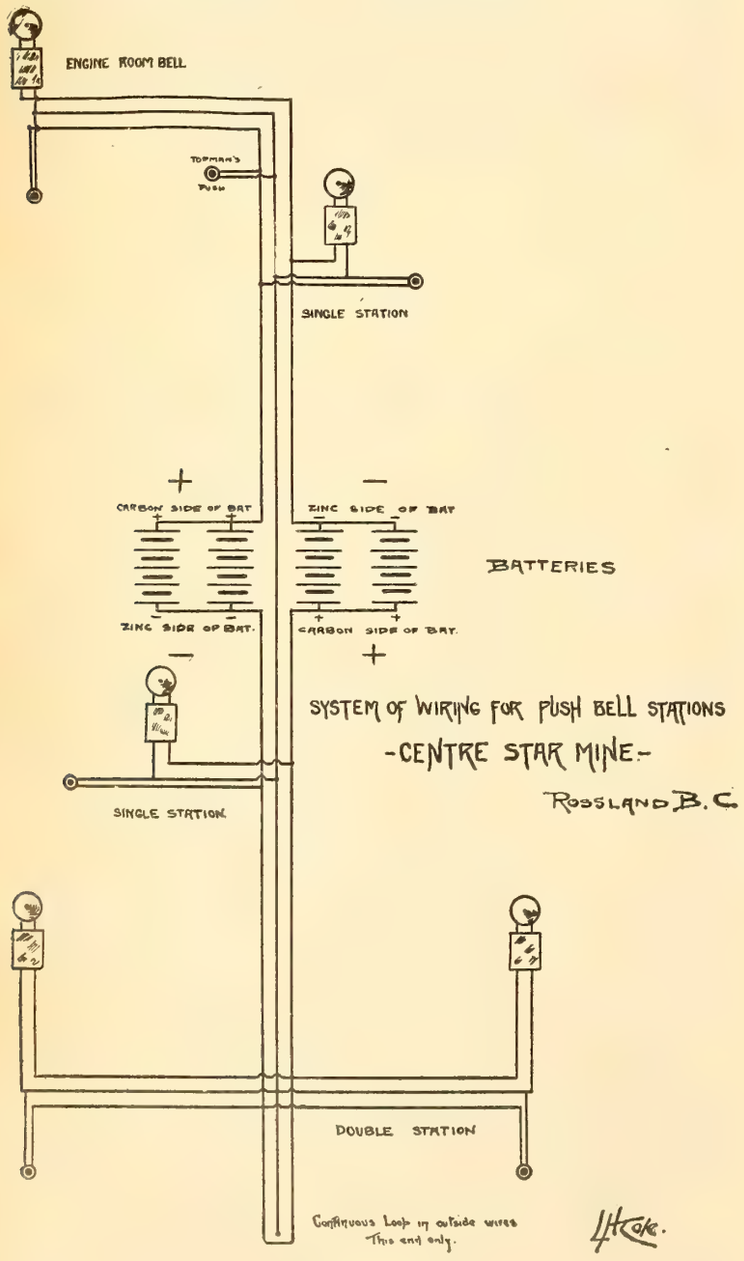
plosion of the powder, are quickly sucked out by the reversed blower, and the working place cleared so that work can be resumed.

Lighting.—The main shaft, stations, and principal tunnels are lighted with electric incandescent 32 C.P. lamps. The wiring for the mine lighting is carried down the shaft in an iron conduit with iron junction boxes at each station. The wiring is so arranged that the lamps can also be used for flash signals if needed.

Telephones.—There is telephonic communication between all the principal mine buildings, and also between the lower mine workings and the shaft house. The system is so arranged that no central exchange is needed. The diagram attached gives the system of wiring for the surface.

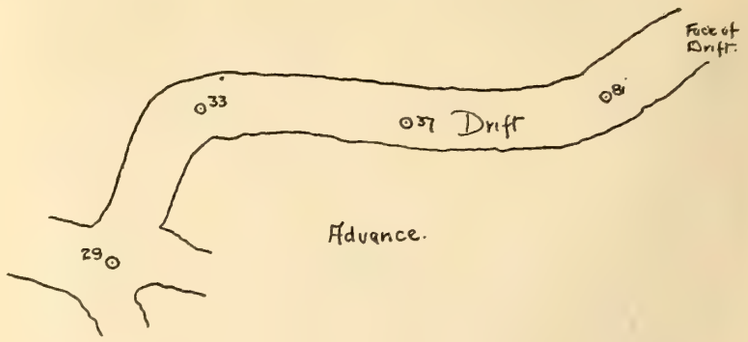
Electric gongs are used for station signals but pull bells are used to move the skips.

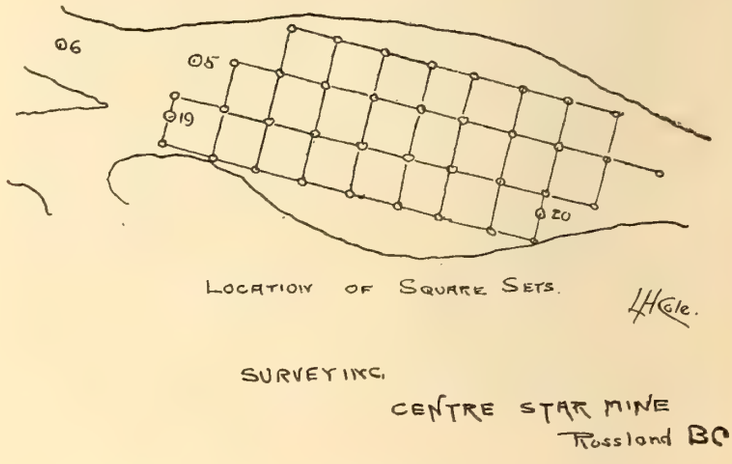
Surface Survey Work.—Except where very accurate work is required, the location of all mine buildings is done by the



stadia method. If accurate work is to be done, a transit and band tape are employed; for levelling, an ordinary level is used. All elevations are calculated from the bench mark located on the Bank of Montreal building in Rossland.

Underground Surveys.—In underground work the transit (reading to minutes) and steel tape are used entirely. Survey stations are set at convenient intervals in the mine, which are accurately located from a line down the shaft. The methods then employed are as follows:—Stations are placed in the back of the drift, etc., by drilling 2 inch holes about 4 inch





deep. Into each of these holes is driven a wooden plug, level with the back. Horseshoe nails, with a pierced head, are placed in the plugs to allow of plumb bobs being hung from them. A brass tag with the number of the station on it is fastened beside each nail.

The advance is surveyed twice a month. It is taken up as follows:—(See Diagram Transit set up at Station 37); Vernier set 0 degree, B.S. on Station 33; a sight is then taken on Station 31 and angle read. Angles are always read twice, by doubling, as a check. The elevation of Station 81 is located, by means of a button set on plumb bob at 81, on a horizontal line from the transit. The horizontal distance between 37 and 81 is measured to the nearest hundredth of a foot, and contours taken, left and right, from the line. This operation is repeated at 81 and sight is taken to face of drift.

Location of Square Sets.—Transit set up at Station 5. (See diagram). Vernier at 0 degree B. Sight taken at Station 6, and the angle turned in a clock-like direction to Station 19, is measured. Elevation of transit below Station 5 is measured. Vertical circle set at 0 degree and button set on line of plumb bob at Station 19. Horizontal distance between Stations 5 and 19 measured. Transit is then set up at Station 19 and angle turned to Station 20, with Station 5 as a back-sight. Station 20 is placed in the cap of the square set, the same distance from the post as Station 19. Bearing of line 19-20 is then the bearing of square sets.

Stopes not having square sets are surveyed in exactly the same way as the drifts except that a longer contour rod is used. Where the walls are very irregular, sights are taken on

different points by the transit, and angle turned is read and the distance measured. The transit telescope is never plunged.

For diamond drill holes a sub-station is located on the end of the drill rod in the same way as a station is. The transit is then set up over sub-station and sight taken to collar of hole, with the last station as B.S. The line from sub-station to collar is the bearing.

The survey of stopes for the vertical projection is, in the case of narrow stopes, taken up with the transit. Transit is set up in a position (located from the nearest station) so that the back can all be seen and sights taken to points on the back and vertical angle read and distance measured.

Square sets stopes are taken up with a 14 ft. rod and steel tape, since back can always be reached from last floor.

The bearings of all lines taken underground are worked out from the azimuth of the back sight, the co-ordinates of the stations only are worked out by the traverse tables. All other points are plotted from their bearing and distances.

The working maps on which all underground work is plotted, are drawn to convenient scales.

Geological maps are kept of each level, also assay sheets on which are plotted all assays run. Tracings of all maps are made for blue-printing.

SAMPLING.—When ore is loaded on cars, it is sold right to the smelters so that all sampling of shipments is made at the *smelter sampling mill.*

Chip samples are taken from the face, and all headings, after each blast, except where running through known country, when only occasional samples are taken.

ASSAYING.—The samples to be assayed consist principally of diamond drill cores, daily chip samples and smelter controls. A double check is kept by assaying a floor sample as well as the ordinary control for each shipment lot. This floor sample is obtained as follows:—When the last cut is made on the sampling floor of the smelter sampling mill, half is sent to the smelter assay office and the other half, which is called the floor sample at the mine, is sent directly to the mine and is treated there exactly as the half at the smelter office. The smelter sample is ground and passed through a 120 mesh and divided into three parts. One part is assayed by the smelter, another part is the control that goes to the mine, and the third is kept for umpire. What remains on the sieve in the form of scales, is cupelled separately and the result added to the pulp assay as metallics. The mine control has had these metallics extracted from it, and in order to keep a check on the metallics the above mentioned floor sample is taken.

The control samples are assayed for gold, silver and copper. The six fusions of one half assay ton each, are run for gold and the average taken. The flux used is a litharge flux as follows:—

Litharge	70 grms.
Soda Bi-Carbonate	15 grms.

and enough nitre or argol to give a 20 grms. button. In order to determine the quantity of nitre or argol to be added, it is necessary to run a preliminary assay. The smelter uses a nitre and nails flux, but the mine finds that, by using a different flux it can obtain closer results. The iodide method is used for control coppers, but for all others, the cyanide method is employed.

A very complete water system is now in operation, which supplies both the Centre Star and War Eagle Mines with water for boilers and compressors and also for fire protection. The water comes from Centre Star Gulch and is handled by two high duty Cameron pumps and a Snow duplex pump. The water is raised 500 ft. through a three inch pipe, 2,000 feet long, and discharged into a 30,000 gallon tank near the War Eagle shaft-house. One hundred feet below this, there is another 30,000 gallon tank, and on the slope of the hill, above the Centre Star shaft-house, there is a third tank of the same capacity. This is provided with a 1,000 gallon per minute Snow duplex underwriters' fire pump, which is always ready for immediate use (using either steam or air) and will give a pressure of 130 lbs. At the level of the company's offices a natural pressure of 100 lbs. at the hydrants is obtained. The system has 28 hydrants placed at convenient points to protect all the buildings of both mines.

Every employee of the company is put through a fire drill and there is a regular fire department in connection with the mine, apart from the city brigade.

Two shifts only of eight hours each are worked. The morning shift goes at 7 a.m. and works, with an hour's intermission, until 4 p.m. The second or afternoon shift starts at 4 p.m., and with an hour for supper at 6 p.m. works till 1 a.m. Two men during the hours from 1 to 7 a.m. blast all the ground drilled and ready for breaking and turn on the blowers, thus leaving the mine free from smoke and ready for the morning shift.

The scale of wages is as follows:—

Shaft men	$4.00
Machine men	3.50
Timbermen	3.50
Muckers	2.50
Carpenters	3.50
Machinists	4.00
Blacksmiths	4.00
" Helpers	3.00
Hoisting engineers	$3.00 and 4.00
Powder and tool boys	2.50
Surface labourers	2.50

The surface men work ten hour shifts with the exception of the carpenters, who only work nine hours, and hoisting engineers, who work eight hours.

The contract system is used largely in both the development work and in the stoping and is found to be very satisfactory. The miners are paid for the amount of advance made in the former and for lengths of holes drilled in stoping. By this means it is found that the drills are used to better advantage during the eight hour shifts.

ASBESTOS NOTES.

The purchase of the asbestos mines and mills belonging to King Bros., at Thetford, by the American Asbestos Co., of Black Lake, of which Mr. H. M. Whitney, of Boston, is the head, is noteworthy. The King Bros., asbestos mines and mills, at Thetford, are the largest in the district, employing upwards of two hundred men and producing daily between forty and fifty tons of asbestos. The main pit, which has been worked now for over twenty-five years, has yielded very large quantities of asbestos, and there is little doubt that there are large masses which have not been touched yet. The large pit has a depth of 165 feet, while the width and length are 200 and 600 feet respectively, and is fitted with cable derricks and hoisting machinery, to handle large quantities of rock. The two mills have a combined capacity of approximately six hundred tons. One of the mills was built five years ago, its capacity is four hundred tons of asbestos rock in twenty-four hours, and it is said to be of higher efficiency than any mill in Thetford.

The purchase comprises, besides the mills and mines in operation, some nine hundred acres of land in Thetford, consisting of town lots and asbestos land and town property in Black Lake. The new management took over the properties on January 2, 1905, Mr. Bennett remaining with the new concern. Plans are now making to increase the capacity of the present mills some fifty per cent.

The new mill of the American Asbestos Co. was started two months ago, and is treating the output of two pits, formerly worked to considerable extent by the late proprietor, Mr. Murphy. The system employed in this mill is entirely different from the other, the motive power is electricity, furnished by the St. Francis Power Co., and the apparatus employed is of different design. This mill will have a capacity of 700 tons of asbestos rock in 24 hours or an output of from 60 to 70 tons of fibered asbestos per day. A new feature of this milling plant is the utilization of fine waste material, which the other mills have been accumulating for future use. This waste material will be manufactured, by means of special apparatus, into asbestic, the output of which will be some 600 tons a day, when the mill is working to its full capacity.

The combined capacity of all the works and mills of the American Asbestos Co., when the Black Lake mill is finished, will be in the neighbourhood of 1,300 tons of asbestos rock per day, or an output of approximately 100 tons of fiber asbestos. These works and mills will be the largest producers in the world.

The Union Asbestos mines, owned by an asbestos manufacturing firm in Hamburg, are working on an extensive scale and 125 men are employed. All the pits are located at the top of the Black Lake Ridge, and at present three pits are in operation. There is a seven drill air compressor and a number of boom and cable derricks on the property; two mills handle the output. The asbestos fibre collected in the pits is cleaned by a crude plant of Chilean mill, rolls and screens. The large mill handles all the asbestos rock and fines transported from the pits. The mines are under the energetic management of Mr. Crabtree with Mr. Rielle as mining engineer.

The Johnson Asbestos Co. is working close to the property of the Montreal and Glasgow Co. The main workings are 90 feet deep, 125 wide and 175 feet long. The asbestos produced contains a larger percentage of No. 1 fibre, than is usually found in Black Lake properties. Most of the fibre is first class, hand cobbing, material and it appears that the short fibre or milling material is not plentiful. The property is prepared for the production of a large output. On account of shortage of men the mill is closed down, but the mine is working with a limited number of men. All milling material is accumulated near the mill and will be run through in next spring.

The Standard Asbestos Company is the most southerly mine on the large Serpentine belt and operates a large tract of asbestos-bearing rock. Operations at present are in the western part of the property; the pit measures 75 feet wide, 100 feet long and about 35 feet deep. A mill for the daily treatment of 150 tons of asbestos rock is erected near the quarries and handles the whole output of the mine. The property is fitted with an air compressor, and modern hoisting and milling machinery. About forty men are steadily employed all the year round but generally there is a shortage of men.

The Manhattan Asbestos Co., which owns a strip of asbestos bearing land next to the Standard Asbestos Co. has let a contract to Mr. Pharo, of Black Lake, to work some of the dumps at the mill. The mill treats about 150 tons of asbestos rock a day and it is reported that both mine and mill will be worked on a large scale in the spring, 1905.

The Syracuse Asbestos Co. has acquired from Dr. Reed lot 28, township of Coleraine, between Black Lake and Thetford. Operations were carried on last summer in a shallow open quarry, where a massive grey green Serpentine exposed a number of seamy partings containing small and large sized asbestos fibre. A small mill has been erected for the production of crude, but plans are now in preparation for the erection of a new fiberizing mill of large capacity.

All the Thetford mines, with the exception of the Beaver, are working vigorously.

The Bells Asbestos Co. is pushing work vigorously; the large output is handled by a mill erected on the eastern side of the Quebec Central R.R. track, at a distance of about 1,000 feet from the quarries. A number of cable derricks and a large hoisting and compressor plant are installed, operations on a large scale go on throughout the year, the main drawback being, sometimes, the shortage of trained miners.

The Johnson Asbestos Co. ,which is working part of the quarry where the Bells Co. is working, has its two mills in permanent operation. Haulage at both the Bells and Johnson mines is performed by locomotives, and 3-ton box cars of the tilting type.

The Quebec Asbestos Co. and the Broughton Asbestos Co., at East Broughton, are pushing work in their quarries, which are all situated in Serpentine belt, which is entirely different in character from that at Thetford and Black Lake. The mill of the Broughton Asbestos Co. has been rebuilt and is treating about 125 tons of rock per day; about 50 men are employed. Mr. H. H. Williams is the manager. The Quebec Asbestos Co. completed its mill several months ago according to the designs of Mr. John Penhale and is working with a force of about 35 men.

The Tropenas Steel Process.

The agents for the Tropenas Converter Steel Process, Messrs. Powell & Colne, of 11 Broadway, New York City, have issued an attractive pamphlet which explains the process and shows its application. Heretofore the vast majority of small castings have been supplied by makers of semi-steel or crucible steel, at a considerable cost for time for turning out even small orders. By the Tropenas Process it is possible to obtain small steel castings of excellent quality and for quick delivery.

This method was adopted after several years experience with open-hearth and crucible steel plants, and after a careful study of the subject of steel making at home and abroad, where the Process is in successful operation in some forty different plants. The Tropenas Process consists in the use of special converters in which pig iron and selected scrap, previously melted in a cupola, are subjected to an air blast of three to four pounds pressure per square inch, directed horizontally across the top of the molten bath. This action generates intense heat by the combustion of the metalloids in the pig iron, and after a period varying from sixteen to twenty minutes, depending on the quality of the charge used, there remains in the converter a bath of nearly pure iron. Addition is made of ferro-manganese or ferro-silicon, or both, to bring up the silicon, manganese and carbon contents to the specified proportions, when the metal is drawn off into a ladle and poured. The Process is simple and the product very regular.

In the suits between Joshua A. Bell, of Montreal, and the Royal Bank, in which the former had two actions against the Bank for $415,000 and $100,000 respectively, and the Bank an action for $127,997 against Bell, judgment has been given dismissing the two actions of Bell against the Royal Bank, and rendering judgment in favour of the Bank in the last suit. These actions arose out of the locally famous case in which Mr. Thos. J. Chisholm sought to purchase the Stanley Mine at Idaho Springs, Colo. Mr. Chisholm is now an absconding debtor and Mr. Bell has lost all his former estate.

OBITUARY.

The death of Sir I. Lowthian Bell removes one of the foremost world authorities on the manufacture of iron and steel. Born at Newcastle in the year 1816, the deceased was in his 88th year at the time of his death. He was educated in the local schools at Newcastle, and received higher education at Edinburgh University and at the Sorbonne, in Paris. He was also indebted to instruction received in his youth in both Germany and Denmark.

Sir Lowthian had been mayor of his native town before receiving his baronetcy in 1885, and had also been a juror at the Philadelphia Exhibition of 1876. He held large interests in the Clarence Iron Works, and in various collieries in England and Wales. His principal publications were "The Chemistry of the Blast Furnace," and the "Principles of the Manufacture of Iron and Steel."

BOOK NOTICES.

The "International Number" of the Mining Magazine, as the January issue is called, is a record number for the quality and value of its contents. The articles on Gold Dredging by Mr. R. H. Postlethwaite, on the Saving of Gold in Alaska and the Klondike by Mr. Chester W. Purington, and on the Deep Leads of Victoria by Mr. Waldemar Lindgren are alone worth the year's subscription.

Not the least valuable feature of this valuable publication is the monthly Digest of articles on Mining which have appeared in the current press. This feature of the Mining Magazine commends itself to every busy engineer, since he gets the gist of the article in compact compass, and is able to find at a glance whether an article is worth careful reading. We must say that the Mining Magazine fills a want of the mining engineer which no other publication attempts to do.

The new year brings to us the Engineering and Mining Journal in a new form, the size being reduced to a page of nine inches by twelve inches. The change will doubtless be appreciated by many of its subscribers. The issue is made up, as usual, at the beginning of the year by a comprehensive review of operations and markets, both at home and abroad, during the past year. There is a comprehensive review of the gold production and situation throughout the world by the chief editor, Mr. T. A. Rickard; this is followed by special articles on copper and copper market, lead, antimony and zinc markets with special articles by acknowledged authorities on the various mineral and metal products of the United States and foreign countries with some article of value to specialists.

The Engineering Magazine distinguishes its new year's issue by one of those special numbers for which this magazine is noted. The first of these special numbers came out some three years ago as a Works' Management number and has been followed by Labour-Saving numbers, and this issue is also denominated a Labour-Saving number. It is devoted chiefly to the various problems which arise from transportation and includes articles by authorities on mechanical conveying and excavating machinery, the transport of air, labour-saving devices in coal mining, the transportation of water by power pumps, underground haulage, etc., etc. The collection of these special numbers of the Engineering Magazine forms a valuable adjunct to any engineer's library.

We have received two numbers of a new publication, "The Chemical Engineer," which is to issue monthly, from Allentown, Pennsylvania. In his bow to the public the editor avows that the scope of the new journal is "exclusively" practical chemistry, or as the Review knew it in its youth—industrial chemistry. The introduction is so much to our liking that we take the liberty of reproducing it.

"We have called our publication 'The Chemical Engineer,' because the vast majority of the technical chemists of the present day are not only workers in the laboratory but have active supervision of the operation of our great chemical and metallurgical industries and hence are strictly speaking engineers, i. e., those who direct an enterprise. Upon them depends the success of the process. They usually select the raw materials, direct as to the proper proportioning of these, oversee the operations required to complete the chemical change from the crude stuff to the finished product and finally test the latter to see if it conforms to the requirements of the use to which it is to be put. One man may not follow the process throughout all its changes and may merely analyze the raw materials while someone else may test the finished product, just as one mechanical engineer may draw the plans and another supervise the construction of the machine.

"As modern technology becomes more specialized it becomes more and more interdependent. It is hard to tell where mechanical engineering ends and civil engineering begins or where the line of demarcation is drawn between mining and metallurgy, or where lie the boundaries separating metallurgy and chemistry."

The names of the contributors to the November and December issues are a guarantee of the quality of the text afforded to readers. We believe there is a large field of usefulness for this new journal, and we wish it all possible good luck.

Mining Share Market.

There has been nothing doing in mining shares since our last report, prices are nominal and unchanged. No one appears, at present, to take any interest in these securities, and there is an entire absence of buyers or sellers.

Business in industrial stocks is fairly good, but prices are irregular; Nova Scotia Steel, Dominion Iron and Steel and Dominion Coal 5's are lower, while the Dominion Iron and Steel stocks show an advance.

There is no news of importance to account for these changes, the fact of the Nova Scotia Steel Co. requiring more money probably accounts for the check in the advance of that stock, and Dominion Coal has not been a favorite of speculators for some time; but to account for the decline in Dominion Iron and Steel bonds, and an advance in the stocks, is too hard a nut to crack for anyone conversant with the Company's affairs, and is one of the riddles of the "street."

The following list shows the quotations for the week ending Saturday, January 14, as supplied to the Review by **Robert Meredith & Co., 57 St. Francois Xavier Street, Montreal:—**

Par value of shares.		Asked.	Bid.
.10	Canadian Gold Fields Syndicate	.06	.04
5.00	Cariboo Hydraulic	.75	—
1.00	Centre Star	.21½	.19
1.00	Deer Trail Consolidated	.02	—
1.00	Giant	.03½	.01
10.00	Granby Consolidated	5.25	5.12
10.00	Montreal and Boston	1.12½	1.00
1.00	North Star	.02	—
1.00	Payne	.04	.01½
1.00	Rambler Cariboo	.17	.15
1.00	Republic	.03½	—
1.00	St. Eugene	.47½	.45
1.00	War Eagle	.10½	.09
1.00	White Bear	.04¾	.04¼
100.00	Nova Scotia Steel (common)	.67½	.67
100.00	Ditto ditto (preferred)	—	—
100.00	Dominion Coal (common)	.63	.61
100.00	Ditto ditto (preferred)	116	113
100.00	Dominion Iron and Steel (common)	.19¼	.19
100.00	Ditto ditto ditto (preferred)	.65	.64½
——	Ditto ditto ditto (bonds)	.82	.81½

INDUSTRIAL NOTES.

Mr. David Mitchell, manager of the Chignecto Coal and Railway Co., advises that the surveys for the railway from the colliery at Chignecto to North Port on the Straits of Northumberland have been completed and that the railway will be built next season.

The electrical equipments of the Soulanges Canal has drawn an expression of opinion from Mr. S. E. Feddon, of the Sheffield Corporation, England, to the effect that it was one of the best applications of electrical energy Mr. Feddon had ever seen. Mr. Feddon also expressed his satisfaction and admiration of the excellent electrical department of McGill University.

The Canadian Car Company is now known to be primarily organized for the benefit of the new Grand Trunk Pacific Railway. The Canadian directors are practically the dummies selected by Grand Trunk and Grand Trunk Pacific interests. The Pressed Steel Car Co. and American capital represent a majority interest and the Canadian interests are a minority.

"The Iron Age," commenting on the equipment and possible production of Canada, states that although the total tonnage is small compared with that of the United States or Great Briain it is nevertheless sufficient for the present needs of the Dominion, and that American iron and steel masters must reconcile themselves to the eventual loss of the Canadian market.

The contract for the erection of the new lift lock at Kirkfield, on the Trent Canal, has been awarded to the Dominion Bridge Company of Montreal. The lock is to overcome a lift of fifty feet and will differ from the lock at Peterborough in that the towers are to be of steel. Work will begin on the new contract immediately, to be completed in the year 1906. The Dominion Bridge Company also built the steel superstructure of the lift lock at Peterborough.

The Westinghouse Electric and Manufacturing Company has closed a contract with the Ontario Power Company for an alternating current generator with a rated output of 10,000 horse-power at 85 per cent. power factor. This is in addition to three other machines which the Westinghouse Company is furnishing for this plant. The generators are of the revolving-field, two-bearing type, designed for direct connection to water-wheels; they generate three-phase current at 12,000 volts and 25 cycles, and run at a speed of 187.½ r.p.m.

The B. Greening Wire Co., of Hamilton, have opened the new year with a new catalogue of their wire rope manufactures. It shows the great variety of ropes which now are made of iron or steel wire, and gives valuable tables of service to the engineer. Their Swedish charcoal rope is made from rods specially imported from Sweden and drawn into wire in the company's mills at Hamilton; for safety and use for passenger elevators this make has a most enviable reputation. The new Acme Brand which has a tensile strength of 120 tons to the square inch of cross-section, is distinguished by having one strand of the six painted a bright green.

The Robb Engineering Company, of Amherst, N.S., have recently completed a new machine shop building which is perhaps the largest shop in the province. It was designed by Mr. A. G. Robb and is 250 feet long by 100 feet wide. The walls are brick and the roof of mill construction, consisting of southern pine trusses spaced eight feet centres. The interior of the building is coated with a special permanent whitewash which does not rub; it is heated by the fan system which utilizes exhaust steam from the mine engine to heat the air before it is distributed through the shop. One-half of the width of the building forms an erecting floor clear from floor to roof and served by an electric crane with a lifting capacity of twenty-five tons. The machinery of the shop is driven by electricity generated from a C. G. E. dynamo driven by a Robb-Armstrong engine; the motors for the separate machines are of both the Westinghouse and Bullock types.

A recent bulletin of the American Iron and Steel Association gives a description of every blast furnace, rolling mill and steel works in Canada, with the character of the product made and the yearly capacity of the works. From this bulletin we summarize that:—

Nova Scotia has three blast furnaces, three rolling mills, and two steel plants.

New Brunswick has one rolling mill.

Quebec has three blast furnaces, five rolling mills, and one steel plant.

Ontario has five furnaces, nine rolling mills and three steel plants.

Nova Scotia and Ontario each have a rolling mill under construction and Manitoba is projecting one. The total number of blast furnaces in Canada is 16, eleven of which use coke and five use charcoal. The completed rolling mills are 18 in number, of which one has a Bessemer steel plant, one a Tropenas, and five have open hearth furnaces. The gross annual capacity of the furnaces is put at 830,000 tons of pig iron; the capacity of the Bessemer and Tropenas steel plants is put at 200,800 tons; the capacity of the open hearth steel plants at 451,000 tons.

MINING NOTES.

NOVA SCOTIA.

The smelter erected at Pictou to smelt copper ores is again reported sold, but this time to Boston men. Last reports were to the effect that Halifax capital had purchased it.

The estimated value of the production of coal in Nova Scotia during the year 1904 was $13,000,000, of gold $500,000, of iron ore $50,000, of pig iron $3,100,000, of steel $2,730,000, and other minerals $605,000.

The Arlington Gold Mining and Milling Co., Ltd., operating at Mooseland, Tangier County, Nova Scotia, is being wound up under the Act of 1889 and the liquidators are advertising the plant to public tender.

The first furnace of the Nova Scotia Steel and Coal Co., which was put in blast at Sydney mines on the 30th of August is now turning out over two hundred tons a day of excellent pig iron. The cost of production from this furnace is less than it was at Ferrona, as, owing to modern appliances used, there are fewer men needed. The company has 100 coke ovens in operation and 150 more nearly ready to be charged.

During the season of 1904 the Dominion Iron and Steel Co. used 232,050 tons from its mine at Wabana, Bell Island, Newfoundland; 25,050 tons from Cartagena, Spain; 24,650 tons from Sweden and 18,936 tons from Lake Superior Mines, U. S. A., a total of 290,686 tons.

The various departments in the steel works of the Dominion Iron and Steel Company were put on double shift on the 2nd of January, and several hundred new men were employed, including a number of skilled workmen, who were brought from the United States.

During the year the Nova Scotia Steel and Coal Company completed and put in successful operation an iron furnace at Sydney Mines which has been running full time and turning out a satisfactory product. The steel furnace of this company is expected to be ready in the spring of 1905.

The year 1904 shows a considerable decrease in the amount of gold produced over 1903, in fact, there has been a steady and marked decline in the production of gold during the last three years. The mine at North Brookfield and another at Caribou, Halifax County, during the year 1904, passed the limit of 1,000 feet in vertical depth, with results which are reported to be in favour of deep sinking.

The mining carried on at Londonderry during the year 1904 was by the open cut method, large amounts of ankerite being mined with the ore. 1904 was also marked by the introduction of cyanide methods at Millipigate and North Brookfield.

A corporation known as the Mabou and Gulf Railway Company have been chartered to build a line of railway from Mabou to Orangedale on the I. C. Railway. The distance is forty miles. The purpose of the railway is to afford an outlet during the winter months for the coal mined at the Mabou collieries; during the summer shipments are made by water from the large pier at the collieries. The company is composed of Boston and Nova Scotia capitalists, and the president is Colonel Boardman Cann, of Boston.

ONTARIO.

Reports from the Paymaster Mine, near Wabigoon are satisfactory.

Reports from the township of Hudson, five miles from New Liskeard, are to the effect that a good deposit of copper pyrites has been found.

The Sault Ste. Marie transfer office has registered the transfer of the North Star Nickel mine from A. C. McCharles to an English concern for a consideration of $100,000.

The new chemistry and mining building, the new name for the School of Practical Science, Toronto, was opened in the first week of January with appropriate ceremonies. The building cost $300,000.

The nickel refining process, owned by Detroit people, has been offered to the Lake Superior Co., and has been investigated by President Warren and E. A. Sjostedt, chemist, for the works, whose opinions have not been made public.

Dr. J. E. Wilkinson and Mr. J. McCart have sold the entire interests on 275 acres of oil lands at Petrolea to New York people; the price is not published, but is said to be the largest in recent years.

The Algoma Steel Company have made application to the audit office at Ottawa for bounty on 13,000 tons of pig iron made from Oct. 1st to Dec. 15th. The amount claimed is $19,540.

Shipments from the Helen mine amounted to 117,135 tons for the year 1904. This mine began to ship in 1899, and for six years the total shipments amounted to 909,106 tons.

The Redeemer Gold Mining Company made a clean-up in December of a two-week's run. The exact return is not made public but is reported at $25 a ton. This property, it will be remembered, is in the Dryden belt.

The Mond Nickel Company's plant at Victoria mine is now in full operation; the company recently declared a dividend of seven per cent. and with the new arrangements which have been made regarding the refining project on the other side, is hopeful of keeping its smelter and bessermerising plant in continuous operation.

A despatch from Port William states that the mill to be erected by J. C. Hunter and associates will be located in West Port William, and that the plans for the contemplated plant will involve an expenditure of close to one million dollars. The smelter will be located between the railways and the river, thus affording both water and rail transportation.

Progress is reported to be steady at the Paymaster Mine and the Laurentian and Volcanic Reef mines in the Manitou section. The Laurentian shaft has now reached a depth of 250 feet, and the shaft on the Volcanic Reef is down to 230 feet.

Reports from Sturgeon Lake say that the mill of the Jack Bay Gold Mining Company has been dredging its stamps steadily for a month; the same reports state that the ore is running much higher than they expected, $10 per ton.

A correspondent from Temagami writes that the Arsenical Ore Production Company (of New York), is to build a concentrating plant at Net Lake, three miles from Temagami. The concentrates from this plant will be sent to Niagara Falls for final treatment.

Mr. T. W. Gibson, director of the Bureau of Mines, is authority for the statement that four carloads of ore shipped to New York from the silver mines near Haileybury gave satisfactory returns. One carload of twenty tons realizing $37,500.

A Seamington despatch states that about the 10th of December a drill which penetrated to a depth of 1,032 feet was stopped by heavy oil pressure, but when boring was resumed with a heavier drill a six-inch stream of oil gushed to a height of seventy feet in the air and is now bearing a flow of seventy-five barrels a day.

The Golden Star Company, in the Sturgeon Lake District, reports considerable development work during the past season. The east cross-cut from No. 2 shaft has driven 105 feet, the west cross-cut 55 feet, and the drive from the latter, 20 feet. From the bottom of No. 3 shaft the cross-cut was driven easterly for 16 feet, cutting an eight foot vein, reports for which are not given. The west cross-cut was driven 15 feet.

Mr. N. W. Rowell states that of the $2,700,000 worth of claims filed against the Lake Superior Corporation all but $500,000 has been paid off. The proceedings which were stayed in June last have been brought before Judge Falconbridge, and the Court has given the company a short time in which to settle some proceedings against other Soo companies. The companies implicated are the Algoma Commercial Co., the Algoma Steel Company and the Sault Ste. Marie Pulp and Paper Company. The aggregate amount of the claims is not large.

Some seven gentlemen from St. Paul, Minn., and North Dakota, have secured from the Ontario Government mining licenses for three years on some lands on Hunter's Island, near the International boundary, which they propose to explore for mineral. Their agreement with the Government undertakes the expenditure of $120,000 in this time. It may be said in this connection, that exploration work previously done on Hunter's Island did not show any great value for the ore obtained; a large corporation who have looked into the deposits do not have any great confidence in the deposits.

The new corporation, The Corundum Refiners, Ltd., referred to in a recent issue of the Review, is exploiting its property (which amounts to 650 acres), in the township of Raglan. The construction of a 100-ton cleaning and concentrating plant has been commenced and completion is promised by the first of June. The site for the mill and town of the company is at Jewelville on the Mattawaska River about one mile distant from the deposits; the Mattawaska River is navigable to this point by a small steamer, and the Canada Atlantic Railway is only eleven miles distant. It is understood that the principal shareholders are Buffalo capitalists.

In an official communication to the Ontario Government the Lake Superior Corporation, through Mr. N. W. Rowell, a director, states that the reorganized corporation is flourishing financially; that it has met all interested payments on its bonds, both those guaranteed by the Province of Ontario and those issued on the credit of the company alone; that it is now disbursing monthly for wages from $125,000 to $130,000. One coke blast furnace, with a capacity of 250 tons per day is at

work, and a charcoal furnace of 150 tons daily capacity will be blast this month. This joint daily output of 400 tons of pig will enable the corporation to discontinue the importation of iron from the United States, which has been necessary in order to keep the rail mill at work. The rails which have been supplied to purchasers thus far have been made from American pig iron.

The new Minister of Crown Lands for Ontario, the Hon. Mr. Mackay, promises changes in the administration of his department in the interests of the practical miner; at the recent party convention in Toronto the Minister moved the following resolution : "That the most liberal terms should be offered to prospectors for minerals, providing that the minerals are developed within a reasonable time and not held merely for speculative purposes." Whether this resolution is a piece of political bounce or whether it is to become a part of the policy of the new administration only time can tell us, but, in speaking of it Mr. Mackay said that it was the intention of his Department to establish local offices with local agents in different mining centres, at which offices records could be obtained as to ground taken up and decisions given, and that the object of this local office would be to correct the trouble, delay and expense incident to coming, or writing, to the head office in Toronto. We wish the Minister luck with his new project.

BRITISH COLUMBIA.

Two cars of ore, recently shipped from the Skylark mine, yielded $107 per ton.

The total production from the mines of the Boundary district is reported to be about 810,000 tons for the year.

In the month of November the product of the Canadian Smelting Works at Trail was 947,168 pounds of lead.

The Venus mill, serving the Athabasca-Venus mines, has been compelled to close owing to lack of water.

The Foghorn in Ymir District, reports a strike of good ore on No. 2 ledge at a depth of 600 feet.

The deposit of iron ore near Crawford Bay, owned by Messrs. McMillan and Robinson, is to be incorporated into a joint stock company.

A. J. McMillan went to England to spend the Christmas holidays with his family in Warwickshire.

The gold production of the Atlin District for 1904 amounted to $600,000 against $420,000 for 1903.

The Silver-lead mines of British Columbia have paid dividends amounting to $3,500,000 since 1892.

The Marysville smelter is to use the Huntington-Heberlein process for treatment of its ores. This process was described in our issue for December.

Mr. G. S. C. Lindsay, general manager of the Crow's Nest Pass Coal Co., has returned to Fernie after spending the Christmas season in Toronto.

The Boundary country now has ten furnaces in blast—six of the Granby furnaces, two of the B. C. copper and two of the Montreal and Boston.

The Rawhide mine belonging to the Consolidated Montreal and Boston Company began regular shipments of ore to the smelter at Boundary Falls on Dec. 21.

The Provincial Mining Association of British Columbia expects to hold its annual meeting in the latter part of January or the first week of February.

Coal from the mine on Coal Hill operated by the Kamloops Coal and Development Company, is now being used as fuel at the Iron Mask. At present two teams are engaged hauling the coal.

The Slocan Star, owned by the Byron N. White Company, has paid total dividends amounting to $517,600; the dividend for 1904 was $50,000, or ten per cent, on the capital stock.

The mines in the Slocan division have not yet enough snow to permit of rawhiding or sleighing the ore to rail connection, and in consequence a number of men were laid off last month.

The Kootenay Belle Group, near Salmo, has been bonded by Patsey Clark, of Spokane, for $100,000 for the period of one year. Mr. Clark intends to push development during the period of his option.

The Tyee Smelter, at Ladysmith, received in December 200 tons of ore by steamer Asnur from the far north, 150 tons came from Alaska and 50 tons from the copper mines at White Horse, Yukon Territory.

From good authority we learn that there are some 13,000 tons of zinc concentrates awaiting purchase in the Slocan country. Of this amount there are about 8,000 tons at Sandon, and 5,000 tons at Kaslo.

The city of Victoria in experimenting with a mixture of granulated slag and clay for a road surface. It is believed that this material, when properly rolled, will make a surface comparable to macadam.

The Northport Smelter will hereafter be able to purchase its coke for $2.00 a ton instead of $2.50, in consequence of the Great Northern Railway's completion to Fernie.

The Alice mine, at Creston, has been compelled to close down owing to lack of water. The flume which supplies the water is frozen solid, and no other water is available.

The C. P. R. claim on Welsher Mountain, in Franklin Camp, near Grand Forks, has had some remarkably good results from the ore recently uncovered. The values run: copper, $8.64; silver, $11 and gold. $8.25 per ton.

Reports from the Lillooet gold dredge show that it continues to do satisfactory work; the dredge is running continuously and making returns of between $300 and $400 for each full day's work. The financial difficulty with the late secretary is being adjusted.

The work at the Princess Royal mine, on Princess Royal Island, will be continued during the winter. Some twenty to thirty men are employed, and the climate will permit of traffic over the lakes during the winter with the exception of about two months.

The owners of the Crofton smelter are still working upon the possibility of making arrangements to handle the output of ore from the Britannia mines; upon the solution of this matter depends the question of re-opening the plant at an early date.

Late advices from the Boundary Creek state that, Mr. S. F. Parrish and Mr. R. H. Anderson are negotiating for the lease or purchase of the B. C. mine in Summit Camp. Mr. Parrish was formerly the manager of the B. C. mine and probably knows its value and possibilities better than most men.

The Iron Mask is steadily producing ore, and every day about two car loads of ore and concentrates are shipped to the smelter. Part of the ore which needs no concentrating is shipped as mined. The big traction engine and a four-horse team are kept busily employed every day hauling stuff to the siding to load on the cars.

Another rich outcrop of quartz has been found in the Granite-Poorman section between Eagle and 49 creeks, below Nelson. This time it occurred in the claim known as the "Green Horn." Fine specimens with visible free gold are characteristic of this gold section, but the trouble has been that such specimens disappeared with depth.

The Imperial Coal and Coke Co., which owns an extensive area of coal lands at Fording River, B.C., has found that certain of its seams carry a good grade of gas coal. Tests show a production of about ten thousand cubic feet per ton, which should qualify this coal for gas production when the western country needs gas.

The Crow's Nest Pass Coal Co. paid out in December a total of $126,842 for pay rolls on their three collieries at Coal Creek, Michel and Carbonado. This represents the wages for something over 1,800 men. The present output of the Coal Company is about one million tons a year.

The Lucky Jim mine, near Bear Lake, sold, during December, 2,000 tons of zinc ore to Batchelor Bros., of Spokane. Of this tonnage 1,200 tons will be delivered as crude ore, and 800 tons will be in the form of concentrates. The lump ore averages 54 per cent. of zinc, and the concentrates 48 per cent.

Owing to lack of ores the Hall Mines, Ltd., have only been running one furnace for quite a period. In view of accumulations during the past month, and having promises of a larger supply from East Kootenay mines, the management planned to blow in a second furnace about the first of the year.

The values reported for the ore chute which has been cut on the 1,450 level on the Le Roi mine are put at $20 per ton in gold, and in consequence the management is encouraged to believe that the Le Roi may duplicate in depth the rich values it yielded near the surface.

The Five Metals Mining Co., located at Crawford Bay, are pushing work upon the cross cut tunnel, and expect to have a sufficient amount of ore developed to supply a 50-ton lead furnace by the first of next June. The company proposes to erect such a furnace if development is satisfactory.

The Van Anda mine, at Texada Island, suspended work in December, and did not give any information to the public as to its intention to resume operations. This mine has been operated for some time by an English concern, and its shut down is ascribed to an inspection which was made by a representative of that company.

The discovery of fire clay on Sumas Mountain, noted in these columns a month or two ago, has been tested by mixing and burning tests which were conducted by the firm of assayers, Messrs. Pellew-Harvey, Bryant and Gilman. We are informed that the tests which were made showed the satisfactory character of the clay.

Advices from Rossland again report the finding of the ore chute on the Jumbo claim. The tunnel driven to cut this ore chute has been in progress for more than a year, but about the middle of December the ore chute was cut and driven on. The width is reported as being between fifteen and thirty feet, but values are not given.

The output of the Boundary country for the month of November was the largest ever recorded and amounted to 72,306 tons. The largest shipper for the month was the Granby with a total of 45,089. The Brooklyn-Stemwinder shipped 7,650 tons, and the iron mine, the Emma, shipped 2,650 tons.

The Slocan Star mine declared a dividend of $25,000 payable on December 14th. This dividend was the second one for the current year 1904. The directors of the Slocan Star contemplate the erection next spring of a Custom zinc concentrating plant on the Slocan Star ground. Over two thousand tons of rough concentrates are piled up at the Star mill awaiting further concentration.

Mr. M. K. Rodgers, manager of the Nickel Plate mine in the Similkameen country has taken an eighteen months' bond on the "Maggie," a group of claims on Bonaparte River, fourteen miles from Ashcroft. The price is $160,000, and a forfeit of $2,500 was paid when the bond was signed. In addition, Mr. Rodgers has purchased thirty acres of land near the tunnel entrance for $350 in order to secure a dump.

The Yale Hydraulic Mining Company, working placer ground near Yale, B.C., has completed the construction of its pipe line, which is over 6,000 feet in length, and, in the early part of November turned on the water. One monitor is in use having a capacity of 1,000 cubic yards of gravel a day. The gravel works easily and tests have shown it to run from 5 to 25cts to the yard .

In the month of November there was shipped to the Trail smelter 639,384 pounds of ore, which yielded 383,862 pounds of metallic lead from the St. Eugene mine, and 593,052 lbs. of ore, yielding 124,172 lbs. of lead from the North Star mine. These two mines produced sixty per cent. of the total amount of lead ore obtained in the Kootenay District for the month of November.

The Granby Company commenced work on the first of December on three new furnaces for the smelter which are to be completed, if possible, by the end of February. The company's officials are reticent, but it is understood that three additional furnaces will be built when the present three are completed, making in all a total of nine new furnaces with a combined capacity of 5,000 tons a day.

The verdict which was obtained by the Centre Star Mining Company against the Rossland Union has been appealed from by the Executive Committee of the Western Federation of Miners. Notice of appeal has been given to the Supreme Court of British Columbia and counsel for the Federation has advised that if necessary the appeal should be taken to the Privy Council.

The first train over the new branch of the Great Northern Railway reached Fernie on the 17th of December. The running of this train marks the practical completion of the new branch line. The station buildings are nearly finished and the operation of this branch, as well as those leading to Morissey, Michel and Coal Creek, has been taken over by the Crow's Nest Pass Coal Co. as operating lessee.

The litigation respecting the title to the Lucky Jack and Swede claims in the Lardeau District has been settled and the title vested in the Great Northern Mines Co. This corporation now holds title to twenty-one claims, including the Oyster Criterion and the Nettle L. The basis of the settlement was a transfer of 75,000 shares of the Great Northern Mines Co.'s stock to J. C. Rutherford and L. Hanna.

A fatal accident occurred at the Silver Cup mine in the Lardeau country the first week in December, by which Mr. Alexander Laing lost his life. Mr. Laing was picking in an old stope when a fall of rock jammed his head between the rock and the footwall; he was dead when he was found. Mr. Laing was a native of Aberdeen, Scotland, and was thirty-three years old. He had lived in the Lardeau for five years, and was an experienced miner.

The Hastings (B.C.) syndicate operating the Arlington mine has, it is reported, shown a year of profitable work. Ore sales to the smelter realized $47,300, after deducting freight and treatment charges. One thousand one hundred and seventy feet of development work was done at an average cost of $7.66 per foot. The ore shipped averaged $52 a ton in gold, and nearly $4.00 a ton in silver. The net profits for the year amounted to $14,600.

The coal trade of the Coast was very slack during the early part of December but is reviving, and it is believed that the tonnage for export will be largely increased as soon as the Australian contracts, given to the Southern Pacific Railway during the strike period, are completed. On one day in December there were no less than eleven vessels taking on coal. The shipments now average 10,000 tons each.

The Boundary Creek "Times" is authority for the statement that a big strike has been made on the La France group, five miles east of Kootenay Lake. The ledge is reported to have been found three feet in width, having an 100 foot ore chute giving values of 200 ounces in silver, $35 in gold, and three per cent. of copper. One tunnel has been driven on the vein for 100 feet, and some hundred feet below another tunnel has been driven in for 250 feet, but there is no evidence that the lead is continuous between these adits.

Reports from the Ymir mine, under date of Dec. 20, are to the effect that pay ore has been found on the 1,000 foot level, and that five feet of milling ore is now being mined from the east drift on that level. The report confirms the correctness of the theory that the ore chute took a sharp trend towards the east, just below the 600 foot level. The grade, however, remains lower than in the upper levels, and cautious management will be required in order to resume the payment of dividends. The total amount paid in dividends to date amounts to $192,000.

B.C. papers contain reports that efforts are being made to re-open the B. C. mine in Summit Camp. The B. C. mine, in former days, shipped out about 100,000 tons of excellent ore, and reports say that something like $750,000 was received from ore sales before the mine closed. The corporation owns a large number of crown granted claims which have not been systematically prospected, and there would appear to be a possible future for the B. C. provided fresh capital and good management can be obtained.

The Master in the Court of Revision for Assessment has decided that the Le Roi Company must pay $15,425.47 according to the provision of the two per cent. clause in the Act providing for the assessment of mining companies. This sum is, in addition to amounts paid by the Le Roi Company for the years 1902 and 1903. Inspection discovered that the returns made for these years were incorrect, and an examination of the company's books substantiated the claim. The company appealed to the Court of Revision and the matter was heard in September last. The company's solicitor intimates that the corporation will appeal to the Supreme Court from the Master's decision.

The ore shipments from different Rossland mines for the year 1904 up to Dec. 28th, are reported as follows:—

Le Roi	141,406
Centre Star	71,899
Centre Star (milled)	4,460
War Eagle	55,966
War Eagle (milled)	3,960
Le Roi No. 2	23,481
Le Roi No. 2 (milled)	10,900
Spitzee	960
Kootenay	5,084
Jumbo	13,303
Cliff	1,340
Velvet-Portland (milled)	2,622
L. X. L.	986
White Bear (milled)	2,030
White Bear	189
Iron Mask	70
Rossland View	80
Golden Rule	5
Total	338,844

The Sandon Standard prints the following list of dividends paid by Slocan mines as authentic. The amounts are from discovery to December 1, 1904.

Payne	$1,420,000
Slocan Star	575,000
Idaho	400,000
Reco	287,500
Rambler Cariboo	220,000
Last Chance	213,000
Whitewater	209,000
Ruth	125,000
Sunset	66,000
Noble Five	50,000
Goodenough	45,188
Washington	38,000
Monitor	27,000
Queen Bess	25,000
Jackson	20,000
Surprise	20,000
Bosun	12,000
Antoine	10,000
Grand total	$4,763,297.

A somewhat unique experience for a chief justice was that given to Mr. Justice Hunter of British Columbia in December, when His Lordship took an expert from each side of the case before him and went

underground in the Slocan in order to get the personal evidence of his own eyes. The suit was one of trespass between the Slocan Star and the Rabbit Paw mining companies and the point at issue was as to the nature of a wall, which was described as a porphyry dike, the plaintiff claimed the dike to be faulted by a fissure and that the defendants were therefore trespassers.

NORTH-WEST TERRITORIES.

The International Coal and Coke Co., at Coleman, are shipping daily over 400 tons of screened coal. The culm is used at the coke ovens.

The Canadian-American Coal and Coke Co. is putting out 650 tons of coal a day. The endless-rope-haulage machinery will be installed and in commission by February 1st. Something over 200 men are on the pay roll.

The compressed air haulage system, installed in the mines of the International Coal and Coke Co., at Coleman, is working satisfactorily. The locomotive hauls from 25 to 30 loaded cars out to the tipple with ease; the load is about 50 tons. The company have some 36 coke ovens in operation.

The site selected for the zinc smelter at Frank, Alberta, is west of the town on ground lying between the No. 2 Tunnel of the Canadian-American Coal and Coke Co. and the river. This site permits of building smoke flues up the side of the hill to the stack which will be erected on top of the hill. The water supply will be taken from Gold Creek.

YUKON.

Three hundred men are wintering in the Kluane Lake country; the bulk of them being on Burwash creek.

The original discoveries on Ledge Creek will be idle during the winter and will have to wait for development until next summer.

Since the building of the Government road from Whitehorse to Kluane Lake was finished freights have fallen from 35 cents per lb. to 8½ cents.

In the trial of McKeen vs. White Channel Gold Hill Hydraulic Co. judgment was reserved. The suit is brought to determine rights to the water from Irish and Big Skookum creeks.

The Lewes River Dredge and Mining Company, operating a dredge on Discovery Claim and Bonanza Creek, had during last summer to thaw all the ground work artificially. The ground thawed too slowly under the summer heat to keep the big dredge at work.

In the suit of Johnson versus Berggren the Sheriff sold the mining claim and machinery belonging thereto on Quartz Creek at public auction. The claim was on the right limit of the Creek, and has not been prospected to any considerable extent.

The Anglo-Klondike Company, Ltd., whose fiscal year closed on Sept. 30, showed a profit account of £7,447 out of which the directors have declared a five per cent. dividend. The company has obtained an extension of its grant of water from Boulder Creek for a further period of ten years, or until July 9, 1920.

The Yukon "World" says that Tanana diggings are full of old machinery that has been shipped there from Dawson, chiefly boilers, and that not over one-half of them are serviceable. A surplus of boilers is reported. The same paper is authority for the statement that the town and district are "distressingly healthy," and that physicians have nothing to do in their profession.

The copper ore sent out from Whitehorse to the smelter at Ladysmith, B.C., was hauled 4½ miles to Whitehorse, then shipped by rail to Skagway, and then transhipped by steamer to Ladysmith. Something over 200 tons have been sent out from the Copper King mine this season. The values on the shipment are not made public, but the gold contents were considerable, and the shipment has more than paid expenses.

Additional reports, under date of November the 18th from the Duncan Creek country on the Upper Stewart River, confirm last month's reports of the shortness of provisions. It transpires that the steamer Prospector was wrecked about opposite the concession of the N. A. T. & T. Co., two miles below McQuesten Creek. The nearest point from which provisions can be obtained is Dominion Creek, the freight for which over the Range will be too exorbitant for most of the miners to pay.

Reports from Fairbanks under date of the 30th of October, state that there was no snow at that date in Fairbanks; the upper end of Chateneka Creek was frozen, but the lower end of the creek was free. It is also reported that few people are left at Circle City this winter. Provisions are said to be low in the camp at Fairbanks, and the probabilities are that many will have to leave that camp before winter is over owing to the scarcity of food. There are double the men in the camp that are needed.

The most costly litigation which has yet occurred in the Yukon Territory was terminated the last week in November by filing the judgment in the Clerk's Office of the Territorial Court of the decision of the Privy Council in the case of Belchers versus McDonald. This case has been on the docket for nearly four years and a half, and is the only Yukon case which has been carried to the Privy Council. The case had no particular relation to the mines, but is notable as the most bitterly contested suit yet fought in the courts of the Yukon.

This fall has seen preparations made for the opening of mining operations in the Alsek country on a scale which is much larger than is customary in the Yukon country. A New York syndicate has grouped all the claims on Bullion Creek from Discovery to 84 below, and is giving a lay on the entire block to receive 75 per cent. of the gross output, the remaining 25 per cent. of the profits to go to the owners. This syndicate is known as the Bullion Creek Hydraulic Company. It will freight from Whitehorse over the new government road some 250 tons of machinery and supplies during the winter. The company proposes building a saw mill at the mouth of Silver Creek, which is directly opposite Bullion Creek, across Lake Kluahne. The claims which have been grouped together will be hydraulic, as Bullion Creek is well adapted for such a method of work, as it has a heavy ground and abundance of water, few large boulders, and gravel that is free from frost. Between Discovery Claim and 84 below there is a drop altitude of about 500 feet. As the creek is about 20 miles long, and the heads in glaciers of the Coast Range, no scarcity of water during the summer season is apprehended.

COAL NOTES

After modification the contract offered by the Dominion Coal Co. to its workmen has been accepted for a period of three years.

At Glace Bay nearly 2,000,000 tons of coal were raised in 1904 from the collieries of the Dominion Coal Co. at that place.

The output of the three collieries belonging to the Nova Scotia Steel and Coal Co., which are at Sydney mines, total 478,022 tons or 30,347 tons in excess of the figures for 1904.

The importations of anthracite coal from the United States in 1904 were 1,936,000 tons, against 1,430,000 tons for 1903. The importations of bituminous coal from the United States fell off some 233,000 tons.

The stoppage of the Sydney steel plant (due to the strike) was one of the causes why coal shipments for 1904 did not come up to expectations. Owing to the unusually late spring the shipment season was late in beginning and the summer was unusually irregular.

The Inverness Railway and Coal Co. made an innovation last season by sending a quantity of coal through the Lakes to Ontario ports. The business was probably not profitable, although the boats that took up the coal took down iron ore.

In some cases the average pay of the workers about the collieries in 1904 was increased. The Hon. R. Drummond figures that the average pay per day during the year 1904 for the Spring Hill miners was $2.99, whereas the average wage for the year 1903 was $2.88. The prophets put the production of Cape Breton County of 1905 at probably 4,000,000 tons, Inverness 350,000 tons, Pictou 750,000 tons, Cumberland 750,000 or a total of 1,200,000 tons more than 1904. It is not probable that this sum will be reached, but it shows what the collieries can do with their increased facilities for output; they do not attempt to say whether a market for all this increased product can be obtained.

One estimate of the shipments from the various Nova Scotia collieries for the year is as follows:—

Dominion Coal Company	2,800,000
Nova Scotia Steel and Coal Co.	480,000
Cumberland Railway and Coal Co.	420,000
Acadia Coal Company	250,000
Inverness Coal Company	240,000
Inverness Railway and Coal Co.	172,000
	4,362,000

In the month of November the output of the Crow's Nest Pass Coal Co. was as follows:—

Coal Creek Colliery	44,867 tons.
Michel Colliery	22,253 "
Carbonada Colliery	7,449 "
Total	74,569 "

The coke made was as follows:—

At Fernie, with 390 ovens	11,950 tons.
At Michel, with 345 ovens	9,157 "
Total	21,107 "

The Crow's Nest Pass Coal Co. has a total of 1,128 ovens.

The output of coal of the Nova Scotia mines for the past year is estimated at 4,450,000 tons made up as follows:—

Cape Breton County	3,050,000 tons.
Inverness County	250,000 "
Cumberland County	600,000 "
Pictou County	550,000 "

The shipments show a slight falling off as compared with the year 1903, the main increase being the product of the Nova Scotia Steel and Coal Company, whose output is about 50,000 tons ahead of 1903; the largest decrease is shown by the Acadia Co., which is over 8,000 tons behind last year. There is nothing which leads to any expectation of an increase for 1905 nor is there anything pointing to a decrease. Probably sales will be increased while output remains practically the same.

The official statement of the output of the Dominion Coal Co. for the month of December is as follows:—

Dominion No. 1	42,748
" No. 2	23,918
" No. 3	17,314
" No. 4 (Caledonia)	39,942
" No. 5 (Reserve)	43,678
" No. 6	.....
" No. 7 (Hub)	2,813
" No. 8 (International)	10,405
" No. 9	13,648
Total for December	194,466

The total for November was 232,720 tons. December shipments aggregated 172,752 tons.

The year's output of the Dominion Coal Co. amounted to 3,023,522 tons, and the shipments to 2,780,037 tons. The output was distributed as follows:—

Year 1904.

Dominion No. 1	415,192 tons.
" No. 2	408,561 "
" No. 3	347,264 "
" No. 4 (Caledonia)	519,457 "
" No. 5 (Reserve)	268,256 "
" No. 6	1,555 "
" No. 7 (Hub)	143,922 "
" No. 8 (International)	193,152 "
" No. 9	226,163 "
	3,023,522 "

Digest of Recent Patents; Mining and Metallurgical.

CANADIAN.

Nov. 22, 1904.

775,414.—Apparatus for Extracting Precious Metal from Ores. John J. Berrigan, East Orange, N.J., assignor to Francis J. Arend, New York, N.Y., and John Bernstrom, Stockholm, Sweden. An apparatus for extracting precious metal from ore by a solution chemically active to dissolve said metal, means for mixing said ore in comminuted form with said solution, means for agitating said mixture, means for centrifugally separating the enriched solution from said ore, and means for conducting said ore and solution from said mixing device to said agitating device and from said agitating device to said separator.

775,405.—Process of Extracting Metals from their Ores. Frederic H. Long, Chicago, Ill. An improvement in the cyanid process of extracting precious metals from their ores that consists in effecting the passage of the entire charge of mixed ore and cyanid solution in successive portions through a contracted channel by injecting into said channel an air-blast of sufficient force and volume to maintain the flow of the charge and to revivify the cyanid and clear the ore.

775,778.—Miner's Car. William J. Neilson, Wilson, Pa. The combination with a mining-car having a hinged gate, of a locking rod, said locking-rod having bent ends, angular clips carried by the sides of said cars and adapted to engage the ends of said rod, and means for automatically releasing said rod at predetermined locations.

775,359.—Apparatus for the Extraction of Zinc. Chas. S. Brand, Knowle, England. The combination with means for the extraction of zinc, of the condensing-chamber, the passage connecting the means for extraction of zinc with the condensing-chamber and a mass of chemically inert and refractory or non-combustible material in said passage.

775,597.—Process of Extracting Gold from Ores. Henry R. Cassel, London, England. A process which consists in gradually and continuously generating by electrolysis at a high current density exceeding ten amperes per square foot of anode-surface. nascent cyanogen in the pulp containing a cyanid and a halogen salt, simultaneously agitating the pulp, dissolving and converting the precious metals into soluble cyanids, and retaining them in solution.

775,548.—Process of Separating Copper or like Metals from their Ores. Paul Weiller, Vienna, and Arthur Weiller, Trieste, Austria-Hungary. A process for separating from their ores copper, silver, lead and all other metals adapted to be precipitated from an acid solution by means of sulfureted hydrogen, consisting in mixing the crushed ore with iron-filings and saltpetre, placing the mixture in a suitable small furnace and igniting the said mixture, whereby the metal is reduced and fused down.

Nov. 29, 1904.

776,424.—Process of Treating Gold and Silver Ores. Charles H. Rider, St. Louis, Mo. A process which consists in placing a charge of approximately five hundred pounds of crushed ore in each of the four receptacles, adding in each receptacle a solution composed of one hundred gallons of water, three to five gallons of commercial sulfuric acid, and fifteen to twenty gallons of commercial nitric acid, and after the silver is dissolved removing the resultant solution to new receptacles, adding the fresh solution to the undissolved ore in the first receptacle, said solution comprising forty gallons of water, five gallons of nitric acid, and ten gallons of hydro-chloric acid, thus dissolving the gold in the first receptacle, then combining the two solutions and precipitating the silver.

775,944.—Ore-Concentrator. Albert H. Stebbins, Little Rock, Ark. The combination of a series of cylindrical chambers varying in size from end to end of the series and each having at one end a reduced connecting portion joined to the larger end of the next preceding chamber, means for introducing spiral or gyratory air-currents into the first of said series of chambers, a discharge-opening in the wall of each of said chambers and a separate tangential inlet for each of said cylindrical chambers.

775,946.—Concentrating-Machine. Albert H. Stebbins, Little Rock, Ark. The combination of a box-like frame, a concentrating-surface arranged above the bottom of said frame to provide a fluid-chamber, means for introducing a blast of fluid into said chamber beneath the concentrating-surface to stratify the material thereon, said concentrating-surface being provided with perforations, said perforations being disposed in groups at an angle to each other in different portions of the concentrating-surface to direct the fluid currents in different directions over said concentrating-surface.

776,145.—Process of Separating Metals from Sulfid Ores.—Charles V. Potter, Balaclava, Victoria, Australia. A process which consists in adding to same an acid solution which is a non-solvent of the previous metals, then applying heat to the same, and removing the sulfids from the surface of the solution.

776,186.—Calcining Furnace. William A. Koneman, Chicago, Ill. An apparatus for calcining gypsum, or the like, the combination of a furnace, a calcining-chamber, a plurality of heat-radiating flues communicating at one end with said furnace, to conduct the hot products of combustion therefrom, and crossing said chamber, a series of vapor-abstracting conduits crossing and open to said chamber, and means for feeding the material to be calcined against and past the sides of said fumes and conduits, the said flues being all closed to said calcining-chamber whereby the said material is kept from physical contact with the hot products of combustion from the furnace during the entire calcining operation.

Dec. 6, 1904.

777,020.—Dumping-Car. Joseph D. Hampton, Hazleton, Pa. A dumping-car having a fixedly-held sides and ends and a gate at one end, a movable bottom, means for automatically moving said bottom and wise to release said gate and carry the load there through to dump the same for the purposes specified.

776,647.—Concentrator. Frederick M. Dillon and Wylie G. Wilson, Denver, Colo. A transversely-inclined concentrating-table having a longitudinal vibration whose tendency is to cause the material to travel thereon from the head toward the tail of the table, the said table having longitudinal riffles arranged in groups of varying height, the highest groups being located upon the upper portion of the transversely-inclined surface, the lowest group being centrally located on said surface, and a third group on the lowest portion of the table.

776,531.—Mine-Car Coupling. Marshall G. Moore, Johnstown, Pa. A car-coupling comprising links and clevises or their equivalent, one or more of said members being twisted about the longitudinal axis thereof, whereby said coupling works freely into its slack position, thus forming a short hanging loop.

Dec. 13, 1904.

777,159.—Apparatus for Recovering Precious Metals. Virginia Tunbridge, Newark, N. J., administratrix of John Tunbridge, deceased. An apparatus comprising a supply-channel having a backwardly-inclined screen at its discharge end, a separator arranged to receive the material from said supply-channel, and provided with a series of sediment-collecting hoppers having sediment-discharges and separated by ridges which are progressively higher toward the outlet, a forwardly-inclined screen located at the outlet of the separator and provided with means for holding soap, a filtering tank connected with the outlet of the separator and provided with upright and depending partitions forming a series of upward and downward passages, filtering material located in the said downward passages, and a channel adapted to receive the overflow from the filter and to direct the said overflow against the sediment withdrawn from the separator.

777,379.—Ore-Leaching Apparatus. William S. Jones. Greensburg, Pa. A leaching-tank having its bottom divided into a series of independent compartments combined with pipes discharging independently to and leading independently from each of the said compartments, the pipes connected to each compartment being each connected with a common supply and each provided with its own independent valve.

777,472.—Dumping Coke-Car. Frank S. Ingoldsby and Joseph R. Bowling, St. Louis, Mo., assignors to The Ingoldsby Automatic Car Company, St. Louis, Mo., a corporation of West Virginia. A coke-car, sides having trusses comprising upper and lower chords, a metal sheathing secured to the lower portion of said trusses, and slats completing the sides above the sheathing.

777,233.—Amalgamator. Elizabeth P. Wilkins, Baltimore, Md. The combination with a receptacle of a cylinder adapted to rotate therein, a stand-pipe rigidly engaged in and projecting below the bottom of said cylinder, a worm conveyor in said stand-pipe projecting below the bottom thereof, inwardly-directed beaters on the bottom and sides of said receptacle and outwardly-directed beaters on the bottom and sides of the cylinder arranged staggering therewith.

Dec. 20, 1904.

778,149.—Apparatus for Treating Pyrites. William B. Simons, Charleston, S.C. An apparatus for treating pyrites for the recovery of sulfur fumes, the combination with a furnace, of two or more series of bars, the bars of each series spaced apart, and said series of bars disposed, one series above and spaced from another, and means for stirring pyrites on one series of bars and causing the same while burning, to descend to the next lower series of bars.

778,100.—Art of reducing Aluminum or other Metals. Henry S. Blackmore, Mount Vernon, N.Y. A process which consists in exposing a compound of the metal to be reduced to the action of a substance having such superior affinity for the electro-negative constituent of the compound that heat is evolved in the said reduction and simultaneously employing the said heat to elevate other ingredients capable of reducing the metal by endothermic reaction to a temperature at which reduction is accomplished, and carrying on the reduction by the action of such ingredients.

777,803.—Gold Separator. Thomas Pollock, Santa Barbara, Cal., assignor of one-third to Charles O. Rios, Santa Barbara, Cal. The combination of a U-shaped pipe having its arms of different lengths, and disposed vertically, a sand-hopper carried by the longer arm, a valve on the bottom of the hopper, a water-inlet tube beneath and adjacent to the valve and disposed obliquely to the pipe, a normally sealed discharged-outlet arranged in the lower part of the bend of the pipe, a mercury-chamber carried by the shorter arm of the pipe, a valve in the pipe beneath the chamber, and an outlet-pipe at the top of chamber.

777,936.—Kiln. Robert Booth, London, and Frederick Crosland, Egremont, England. A kiln for calcining lime or other material having a vertical shaft or passage, the top of which is in cross-section longer in one direction than in the opposite direction, said shaft having a bottom portion which is of similar shape to the top but with the longer axis of the elongated section extending crosswise to that of the upper section, and said shaft having an intermediate portion substantially circular in section at one point and gradually conforming above and below said circular zone to the shape of the top and bottom portions.

778,096.—Process of making coal briquets. John W. Barnes, Philadelphia, Pa., assignor of one-half to Clara G. Hobson, Philadelphia, Pa. A process consisting in intimately mixing in the proportions substantially recited, granulated coal, molasses, and paraffin, and hot water, then forming the mass into briquets, then subjecting the same to a temperature of from 280 to 300 Fahrenheit, and then sprinkling said briquets with a mixture of paraffin and hot water, and finally drying the briquets.

Dec. 27, 1904.

778,345.—Process of Reducing Metallic Oxids with Metallic Aluminum. Frederick C. Weber, Chicago, Ill. A method which consists in subjecting the to-be-treated charge, comprising aluminum in admixture with a metallic oxid reducible by aluminum, to an initial drying for removal of hygroscopic or ordinarily-present moisture thereby completely and absolutely dehydrating the material and then briqueting the dehydrated dry hot charge in a treatment preparatory to reduction of the charge.

778,458.—Centrifugal Machine. John C. Morrison, Chicago, Ill., assignor to United States Peat Fuel Company, a corporation of Illinois. The combination with a basket open at top and normally closed at bottom, and such basket being adapted for continuous rotation, of means for feeding separate charges of wet material through the open top into such basket, means for automatically discharging the moisture-relieved material through a temporarily-opened bottom of same, and instrumentalities connecting such feeding and discharging means whereby their action is made intermittent while the basket continues to revolve.

778,614.—Gas-Producer. Samuel T. Wellman, Charles H. Wellman, and John W. Seaver, Cleveland, Ohio, assignors to The Wellman-Seaver Engineering Company, Cleveland, Ohio, a corporation of Ohio. The combination is a gas-producer, of hollow stirring or agitating arms, a rotating elements of the producer carrying the same and having a partition whereby it is divided into two chambers, one of which communicates with said hollow arms, pipes projecting into the hollow arms and communicating with the other of said chambers, and means for supplying water to one of the said chambers and conveying it from the other.

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Camborne, Cornwall, England

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PROVINCE OF NOVA SCOTIA.

Leases for Mines of Gold, Silver, Coal, Iron, Copper, Lead, Tin

—AND—

PRECIOUS STONES.

TITLES GIVEN DIRECT FROM THE CROWN, ROYALTIES AND RENTALS MODERATE.

GOLD AND SILVER.

Under the provisions of Chap. 1, Acts of 1892, of Mines and Minerals, Licenses are issued for prospecting Gold and Silver for a term of twelve months. Mines of Gold and Silver are laid off in areas of 150 by 250 feet, any number of which up to one hundred can be included in one License, provided that the length of the block does not exceed twice its width. The cost is 50 cents per area. Leases of any number of areas are granted for a term of 40 years at $2.00 per area. These leases are forfeitable if not worked, but advantage can be taken of a recent Act by which on payment of 50 cents annually for each area contained in the lease it becomes non-forfeitable if the labor be not performed.

Licenses are issued to owners of quartz crushing mills, who are required to pay Royalty on all the Gold they extract at the rate of two per cent. on smelted Gold valued at $19 an ounce, and on smelted Gold valued at $18 an ounce.

Applications for Licenses or Leases are receivable at the office of the Commissioner of Public Works and Mines each week day from 10 a.m. to 4 p.m., except Saturday, when the hours are from 10 to 1. Licenses are issued in the order of application according to priority. If a person discovers Gold in any part of the Province, he may stake out the boundaries of the areas he desires to obtain, and this gives him one week and twenty-four hours for every 15 miles from Halifax in which to make application at the Department for his ground.

MINES OTHER THAN GOLD AND SILVER.

Licences to search for eighteen months are issued, at a cost of thirty dollars, for minerals other than Gold and Silver, out of which areas can be selected for mining under lease. These leases are for four renewable terms of twenty years each. The cost for the first year is fifty dollars, and an annual rental of thirty dollars secures each lease from liability to forfeiture for non-working.

All rentals are refunded if afterwards the areas are worked and pay royalties. All titles, transfers, etc., of minerals are registered by the Mines Department for a nominal fee, and provision is made for lessees and licensees whereby they can acquire promptly, either by arrangement with the owner or by arbitration, all land required for their mining works.

The Government as a security for the payment of royalties, makes the royalties first lien on the plant and fixtures of the mine.

The unusually generous conditions under which the Government of Nova Scotia grants its minerals have introduced many outside capitalists, who have always stated that the Mining laws of the Province were the best they had had experience of.

The royalties on the remaining minerals are: Copper, four cents on every unit; Lead, two cents upon every unit; Iron, five cents on every ton; Tin and Precious Stones, five per cent.; Coal, 10 cents on every ton sold.

The Gold district of the Province extends along its entire Atlantic coast, and varies in width from 10 to 40 miles, and embraces an area of over three thousand miles, and is traversed by good roads and accessible at all points by water. Coal is known in the Counties of Cumberland, Colchester, Pictou and Antigonish, and at numerous points in the Island of Cape Breton. The ores of Iron, Copper, etc., are met at numerous points, and are being rapidly secured by miners and investors.

Copies of the Mining Law and any information can be had on application to

THE HON. A. DRYSDALE,
Commissioner Public Works and Mines,
HALIFAX, NOVA SCOTIA.

PROVINCE OF QUEBEC

The attention of Miners and Capitalists in the United States and in Europe is invited to the

GREAT MINERAL TERRITORY

Open for investment in the Province of Quebec.

Gold, Silver, Copper, Iron, Asbestos, Mica, Plumbago, Phosphate, Chromic Iron, Galena, Etc.

ORNAMENTAL AND STRUCTURAL MATERIALS IN ABUNDANT VARIETY.

The Mining Law gives absolute security to Title, and has been specially framed for the encouragement of Mining.

Mining concessions are divided into three classes :—

1. In unsurveyed territory (*a*) the first class contains 400 acres, (*b*) the second, 200 acres, and (*c*) the third, 100 acres.

2. In surveyed townships the three classes respectively comprise one, two and four lots.

All lands supposed to contain mines or ores belonging to the Crown may be acquired from the Commissioner of Colonization and Mines (*a*) as a mining concession by purchase, or (*b*) be occupied and worked under a mining license.

No sale of mining concessions containing more than 400 acres in superficies can be made by the Commissioner to the same person. The Governor-in-Council may, however, grant a larger extent of territory up to 1,000 acres under special circumstances.

The rates charged and to be paid in full at the time of the purchase are $5 and $10 per acre for mining lands containing the superior metals* ; the first named price being for lands situated more than 12 miles and the last named for lands situated less than 12 miles from the railway.

If containing the inferior metal, $2 and $4 according to distance from railway.

Unless stipulated to the contrary in the letters patent in concessions for the mining of superior metals, the purchaser has the right to mine for all metals found therein ; in concessions for the mining of the inferior metals, those only may be mined for.

*The superior metals include the ores of gold, silver, lead, copper, nickel, graphite, asbestos, mica, and phosphate of lime. The words inferior metals include all other minerals, and ores.

Mining lands are sold on the express condition that the purchaser shall commence *bona fide* to mine within two years from the date of purchase, and shall not spend less than $500 if mining for the superior metals ; and not less than $200 if for inferior metals. In default, cancellation of sale of mining lands

(*b*) Licenses may be obtained from the Commissioner on the following terms :—Application for an exploration and prospecting license, if the mine is on private land, $2 for every 100 acres or fraction of 100 ; if the mine is on Crown lands (1) in surveyed territory, $5 for every 100 acres, and (2) in unsurveyed territory, $5 for each square mile, the license to be valid for three months and renewable. The holder of such license may afterwards purchase the mine, paying the prices mentioned.

Licenses for mining are of two kinds: Private lands licenses where the mining rights belong to the Crown, and public lands licenses. These licenses are granted on payment of a fee of $5 and an annual rental of $1 per acre. Each license is granted for 200 acres or less, but not for more ; is valid for one year, and is renewable on the same terms as those on which it was originally granted. The Governor-in-Council may at any time require the payment of the royalty in lieu of fees for a mining license and the annual rental—such royalties, unless otherwise determined by letters patent or other title from the Crown, being fixed at a rate not to exceed three per cent. of the value at the mine of the mineral extracted after deducting the cost of mining it.

The fullest information will be cheerfully given on application to

THE MINISTER OF LANDS, MINES AND FISHERIES,
PARLIAMENT BUILDINGS, QUEBEC.

Ontario's Mining Lands..

THE Crown domain of the Province of Ontario contains an area of over 100,000,000 acres, a large part of which is comprised in geological formations known to carry valuable minerals and extending northward from the great lakes and westward from the Ottawa river to the Manitoba boundary.

Iron in large bodies of magnetite and hematite: copper in sulphide and native form; gold, mostly in free milling quartz; silver, native and sulphides; zincblende, galena, pyrites, mica, graphite, talc, marl, brick clay, building stones of all kinds and other useful minerals have been found in many places, and are being worked at the present time.

In the famous Sudbury region Ontario possesses one of the two sources of the world's supply of nickel, and the known deposits of this metal are very large. Recent discoveries of corundum in Eastern Ontario are believed to be the most extensive in existence.

The output of iron, copper and nickel in 1903 was much beyond that of any previous year, and large developments in these industries are now going on.

In the older parts of the Province salt, petroleum and natural gas are important products.

The mining laws of Ontario are liberal, and the prices of mineral lands low. Title by freehold or lease, on working conditions for seven years. There are no royalties.

The climate is unsurpassed, wood and water are plentiful, and in the summer season the prospector can go almost anywhere in a canoe.

The Canadian Pacific Railway runs through the entire mineral belt.

For reports of the Bureau of Mines, maps, mining laws, etc., apply to

HONORABLE E. J. DAVIS,
Commissioner of Crown Lands,

or

THOS. W. GIBSON,
Director Bureau of Mines,
Toronto, Ontario.

Dominion of Canada

SYNOPSIS OF REGULATIONS

For disposal of Minerals on Dominion Lands in Manitoba, the North-west Territories and the Yukon Territory.

COAL.

Coal lands may be purchased at $10 per acre for soft coal and $20 for anthracite. Not more than 320 acres can be acquired by one individual or company. Royalty at the rate of ten cents per ton of 2,000 pounds shall be collected on the gross output.

QUARTZ.

Persons of eighteen years and over and joint stock companies holding free miner's certificates may obtain entry for a mining location.

A free miner's certificate is granted for one or more years, not exceeding five, upon payment in advance of $7.50 per annum for an individual, and from $50 to $100 per annum for a company, according to capital.

A free miner, having discovered mineral in place, may locate a claim 1500 x 1500 feet by marking out the same with two legal posts, bearing location notices, one at each end on the line of the lode or vein.

The claim shall be recorded within 15 days if located within ten miles of a mining recorder's office, one additional day allowed for every additional ten miles or fraction. The fee for recording a claim is $5.

At least $100 must be expended on the claim each year or paid to the mining recorder in lieu thereof. When $500 has been expended or paid, the locator may, upon having a survey made, and upon complying with other requirements, purchase the land at $1.00 an acre.

Permission may be granted by the Minister of the Interior to locate claims containing iron and mica, also copper, in the Yukon Territory of an area not extending 160 acres.

The patent for a mining location shall provide for the payment of a Royalty ot 2½ per cent. of the sales of the products of the location.

PLACER MINING.

Manitoba and the N. W. T., excepting the Yukon Territory.—Placer mining claims generally are 100 feet square; entry fee $5, renewable yearly. On the North Saskatchewan River claims are either bar or bench, the former being 100 feet long and extending between high and low water mark. The latter includes bar diggings, but extends back to the base of the hill or bank, but not exceeding 1,000 feet. Where steam power is used, claims 200 feet wide may be obtained.

Dredging in the rivers of Manitoba and the N. W. T., excepting the Yukon Territory.—A free miner may obtain only two leases of five miles each for a term of twenty years, renewable in the discretion of the Minister of the Interior.

The lessee's right is confined to the submerged bed or bars of the river below low water mark, and subject to the rights of all persons who have, or who may receive entries for bar diggings or bench claims, except on the Saskatchewan River, where the lessee may dredge to high water mark on each alternate leasehold.

The lessee shall have a dredge in operation within one season from the date of the lease for each five miles, but where a person or company has obtained more than one lease one dredge for each fifteen miles or fraction is sufficient. Rental, $10 per annum for each mile of river leased. Royalty at the rate of two and a half per cent. collected on the output after it exceeds $10,000.

DREDGING IN THE YUKON TERRITORY.

Six leases of five miles each may be granted to a free miner for a term of twenty years, also renewable.

The lessee's right is confined to the submerged bed or bars in the river below low water mark, that boundary to be fixed by its position on the 1st day of August in the year of the date of the lease.

The lessee shall have one dredge in operation within two years from the date of the lease, and one dredge for each five miles within six years from such date. Rental, $100 per mile for first year and $10 per mile for each subsequent year. Royalty, same as placer mining.

PLACER MINING IN THE YUKON TERRITORY.

Creek, gulch, river and hill claims shall not exceed 250 feet in length, measured on the base line or general direction of the creek or gulch, the width being from 1,000 to 2,000 feet. All other placer claims shall be 250 feet square.

Claims are marked by two legal posts, one at each end, bearing notices. Entry must be made within ten days, if the claim is within ten miles of mining recorder's office. One extra day allowed for each additional ten miles or fraction.

The person or company staking a claim must hold a free miner's certificate.

The discoverer of a new mine is entitled to a claim of 1,000 feet in length, and if the party consists of two, 1,500 feet altogether, on the output of which no royalty shall be charged, the rest of the party ordinary claims only.

Entry fee, $10. Royalty at the rate of two and one-half per cent. on the value of the gold shipped from the Yukon Territory to be paid to the Comptroller.

No free miner shall receive a grant of more than one mining claim on each separate river, creek or gulch, but the same miner may hold any number of claims by purchase, and free miners may work their claims in partnership by filing notice and paying fee of $2. A claim may be abandoned, and another obtained on the same creek, gulch or river, by giving notice and paying a fee.

Work must be done on a claim each year to the value of at least $200.

A certificate that work has been done must be obtained each year; if not, the claim shall be deemed to be abandoned, and open to occupation and entry by a free miner.

The boundaries of a claim may be defined absolutely by having a survey made and publishing notices in the Yukon Official Gazette.

PETROLEUM.

All unappropriated Dominion Lands in Manitoba, the North-West Territories and within the Yukon Territory are open to prospecting for petroleum, and the Minister may reserve for an individual or company having machinery on the land to be prospected, an area of 640 acres. Should the prospector discover oil in paying quantities, and satisfactorily establish such discovery, an area not exceeding 640 acres, including the oil well and such other land as may be determined, will be sold to the discoverer at the rate of $1.00 an acre subject to royalty at such rate as may be specified by order-in-council.

Department of the Interior,

Ottawa, February, 1904.

W. W. CORY,

Deputy of the Minister of the Interior.

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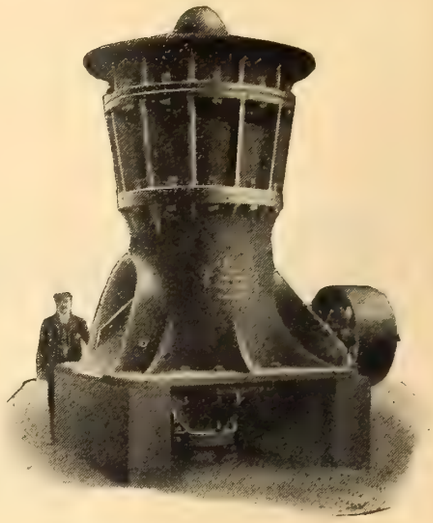

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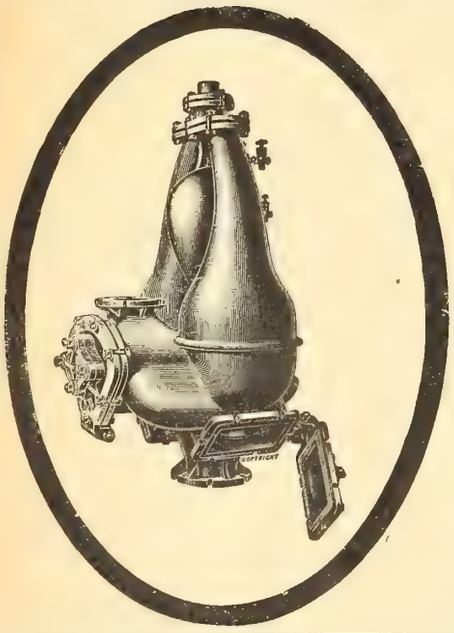

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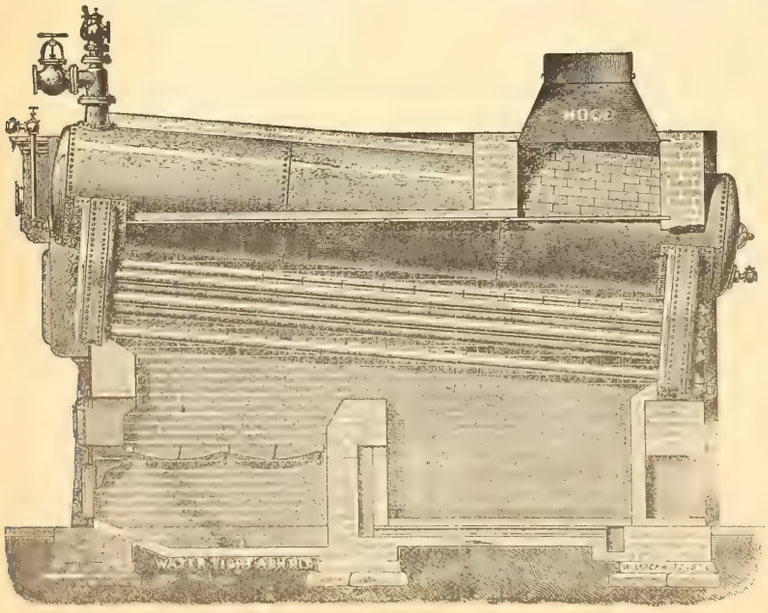

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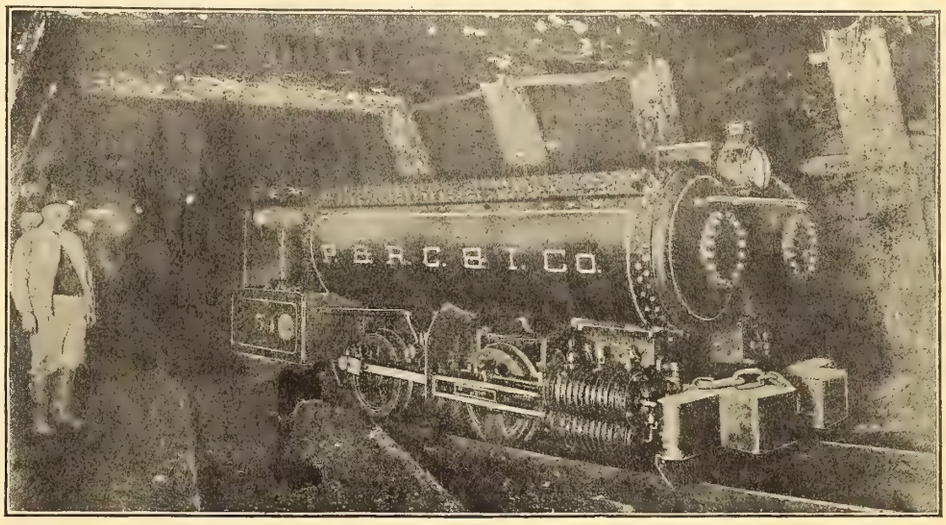

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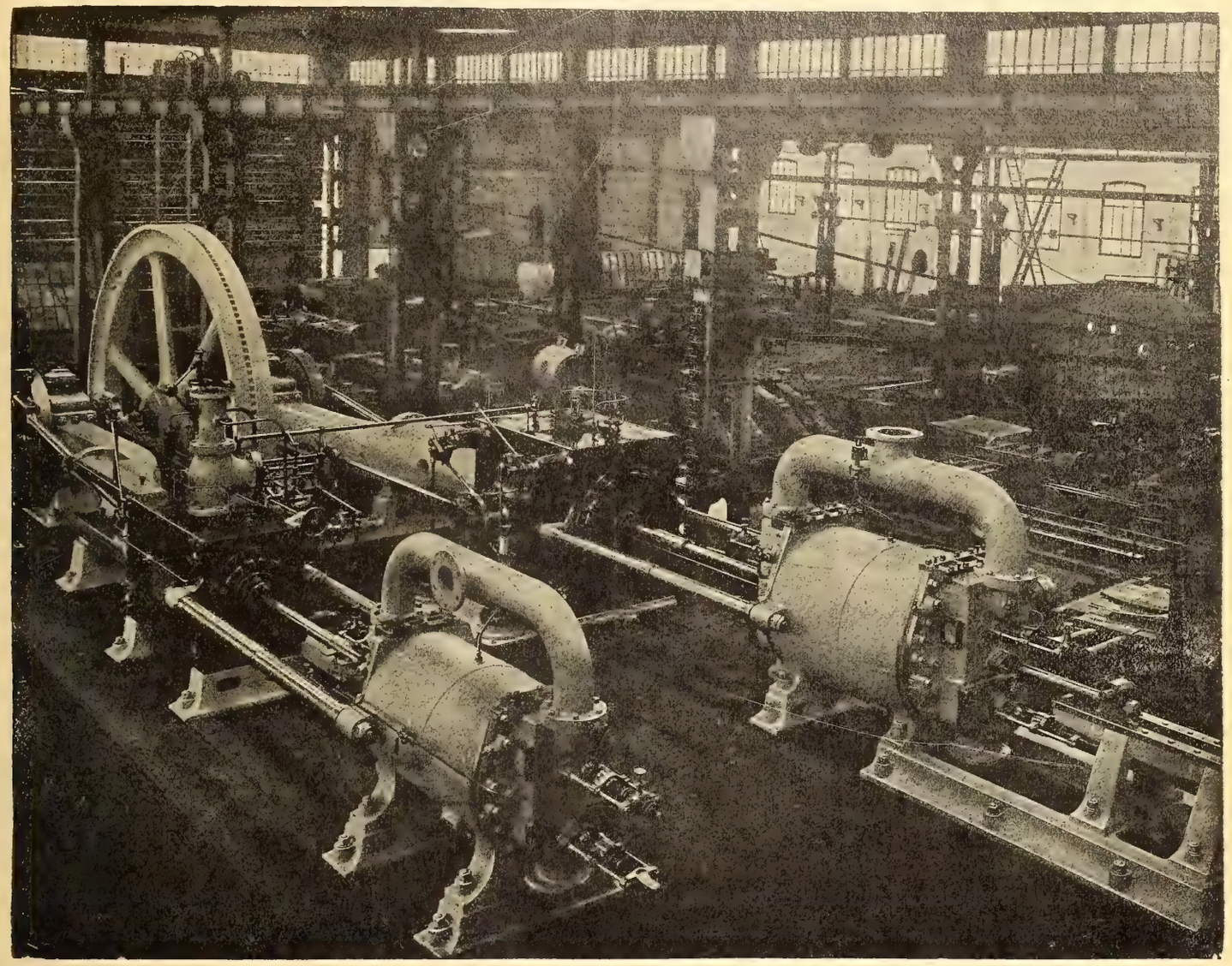

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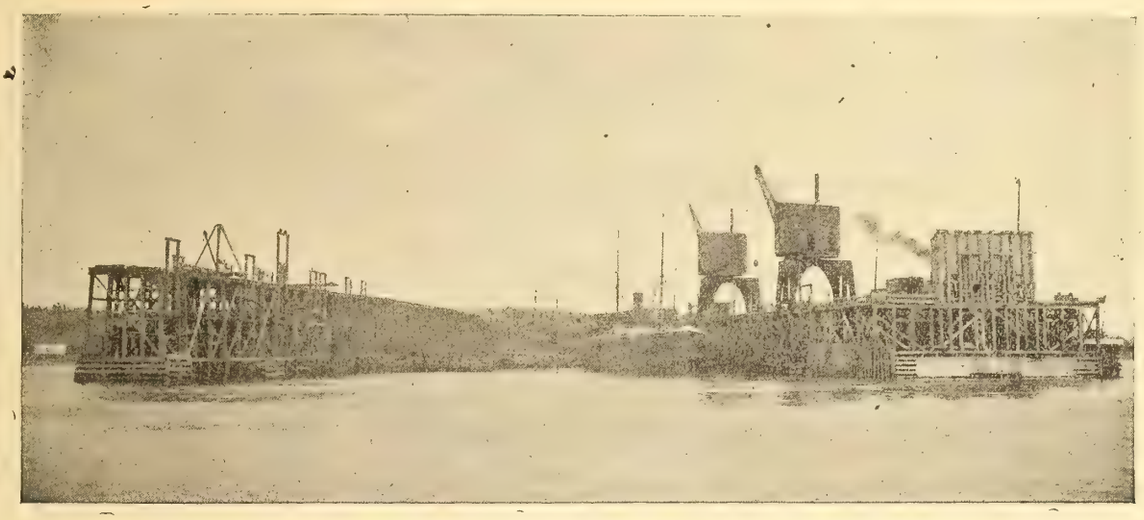

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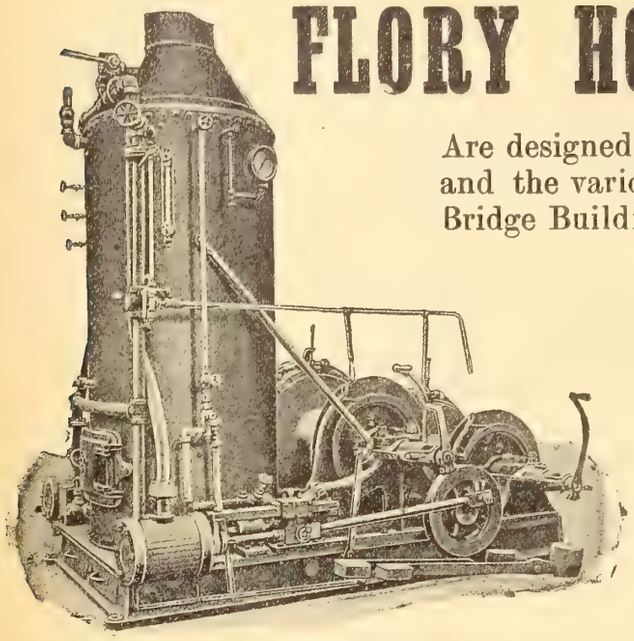

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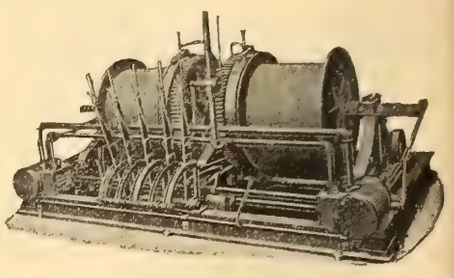

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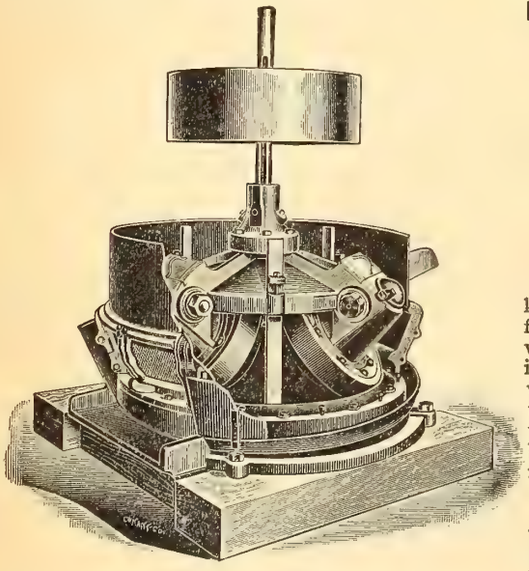

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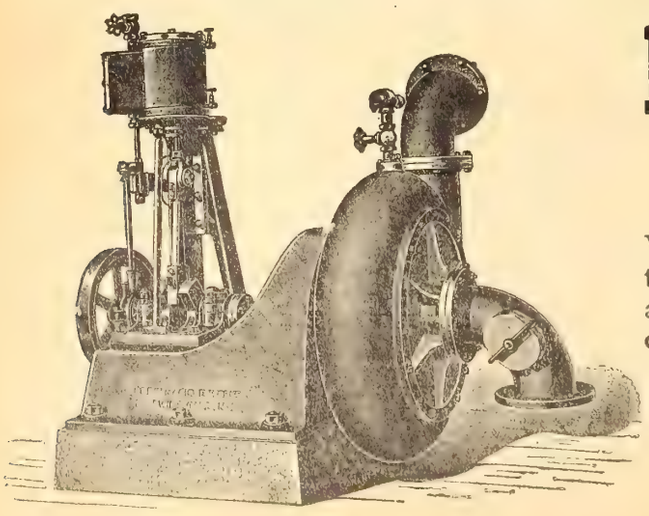

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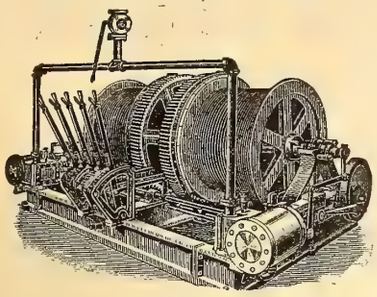

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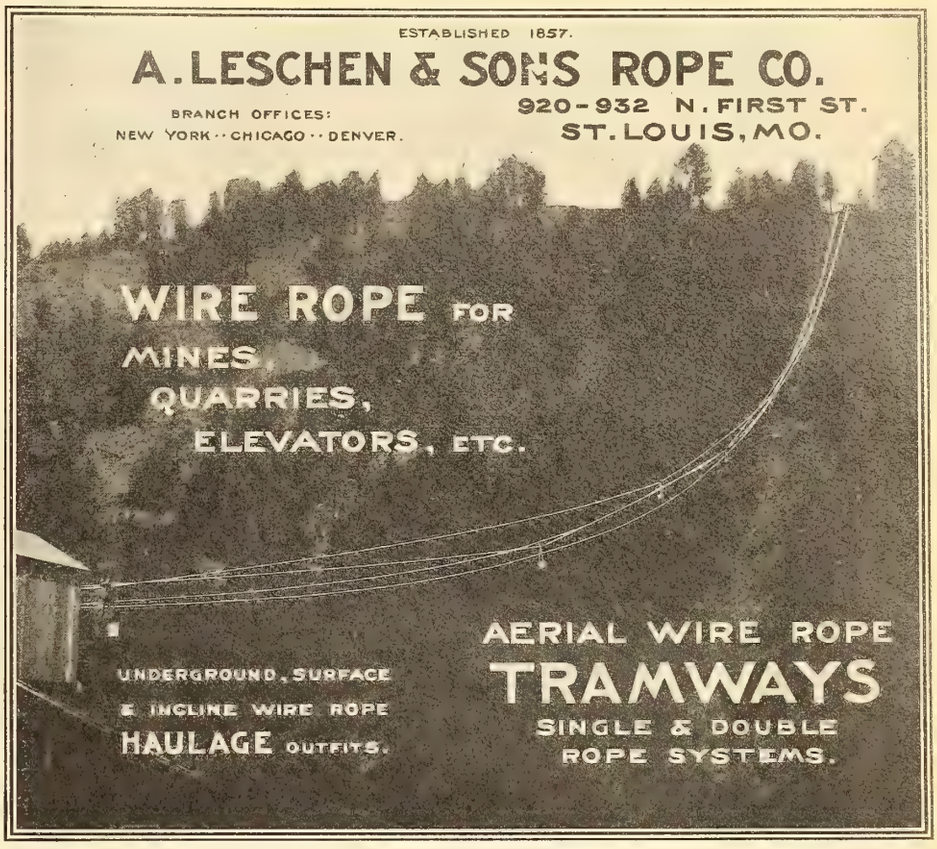

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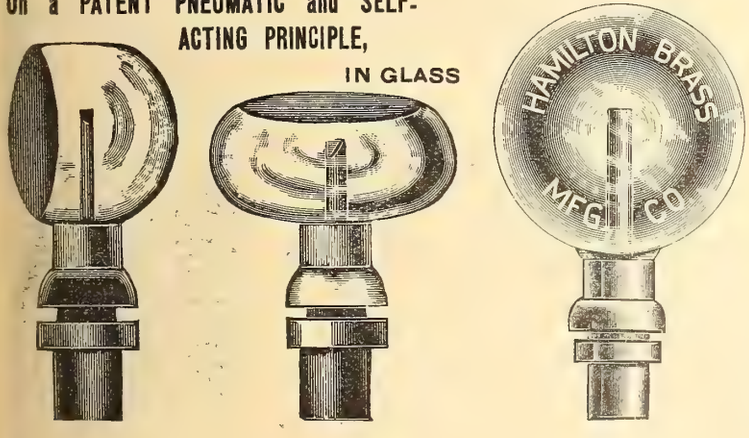

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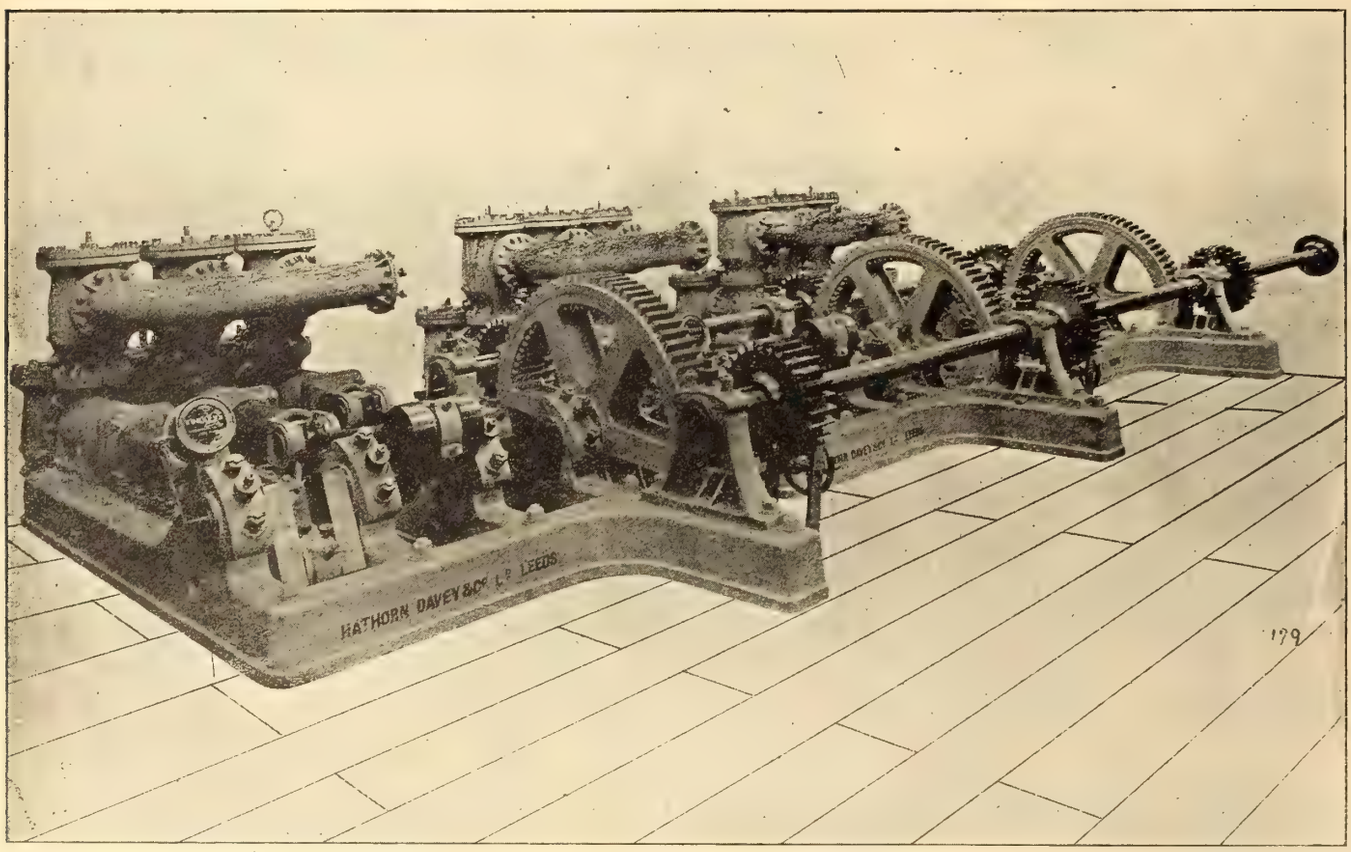

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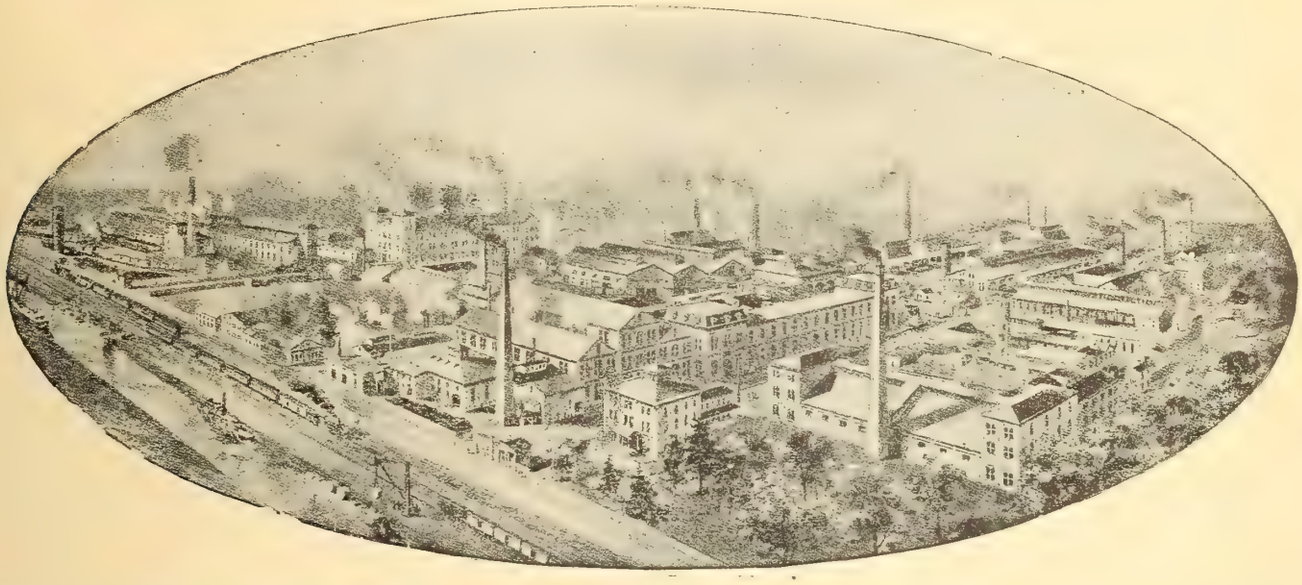

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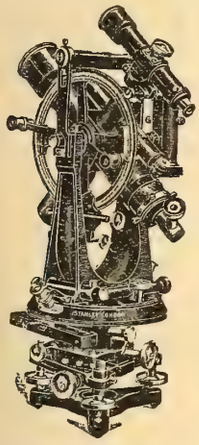

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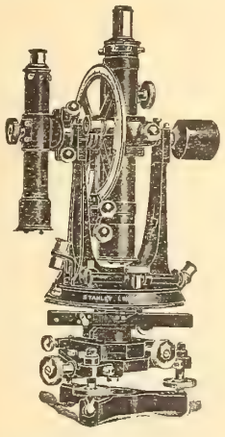

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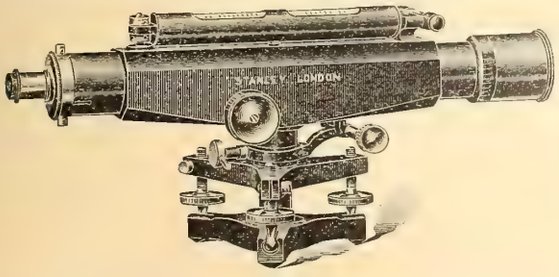

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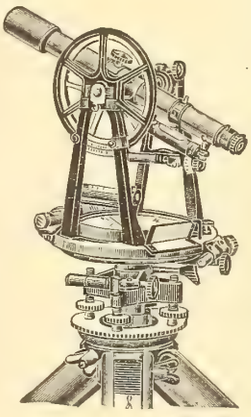

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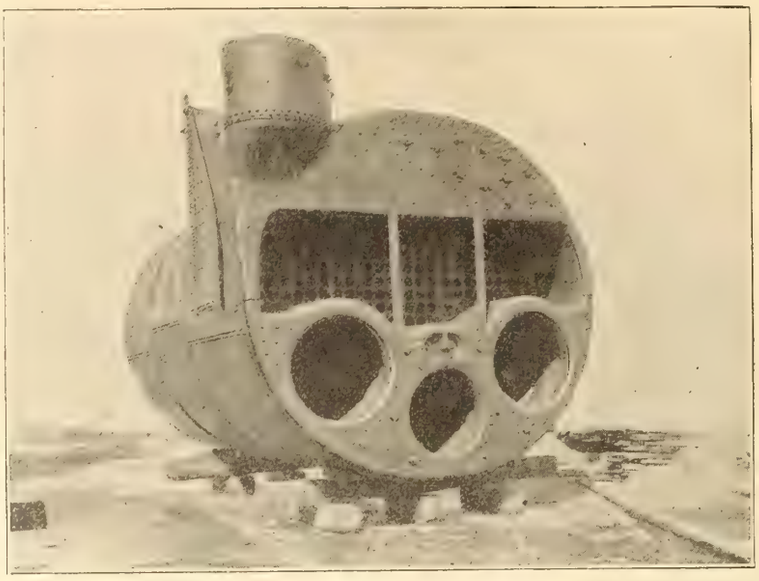

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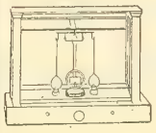

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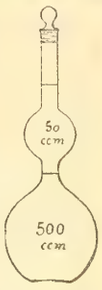

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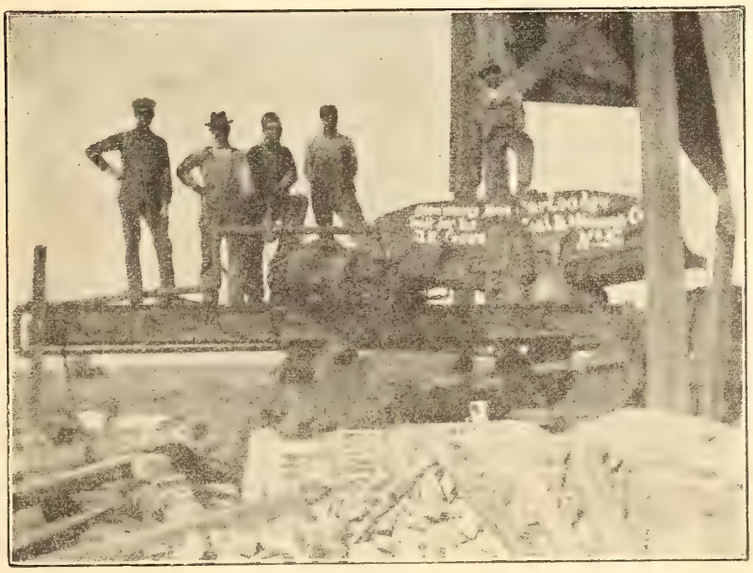

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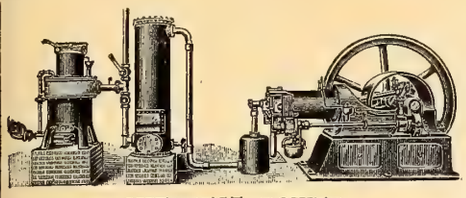

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The Council of the Institute will award a Gold Medal, presented by the President, for the best paper contributed by student members to the Transactions of the Institute during the year 1904.

STUDENTS' PRIZES.

In addition to the President's Gold Medal the Council offers three prizes of a cash value of twenty-five dollars each for the best papers contributed by Canadian mining students on the following subjects:—

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GROUP III.—ORE DRESSING AND METALLURGY—Any branch of ore dressing or metallurgy may be treated, as for example—crushing, jigging, milling, concentrating, smelting, roasting, cyaniding, etc., or some particular plant may be described or discussed.

Competitors must advise the titles of their subjects to the Acting Secretary of the Institute not later than the 15th February next and MSS. must be sent to him on or before the opening session of the meeting on the 1st of March.

SYLLABUS OF PAPERS.

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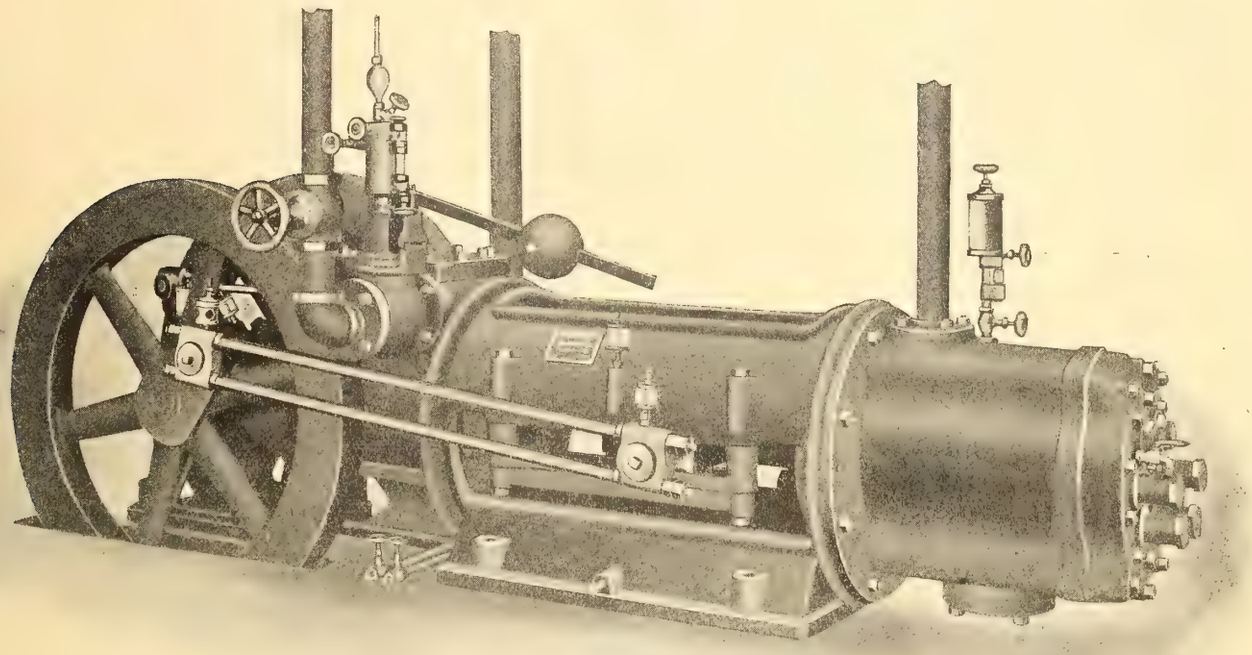

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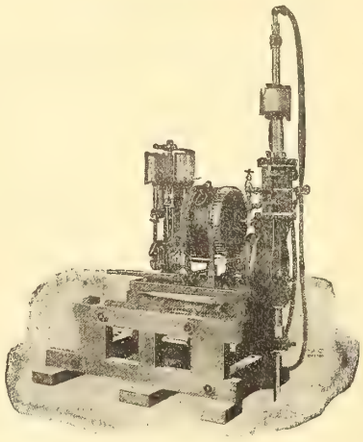

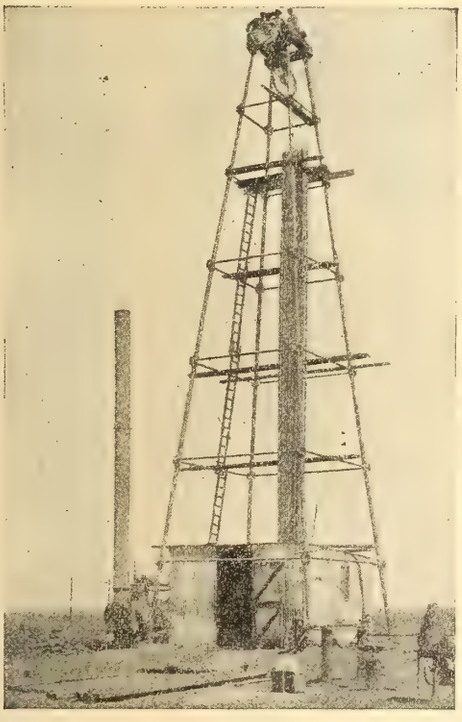

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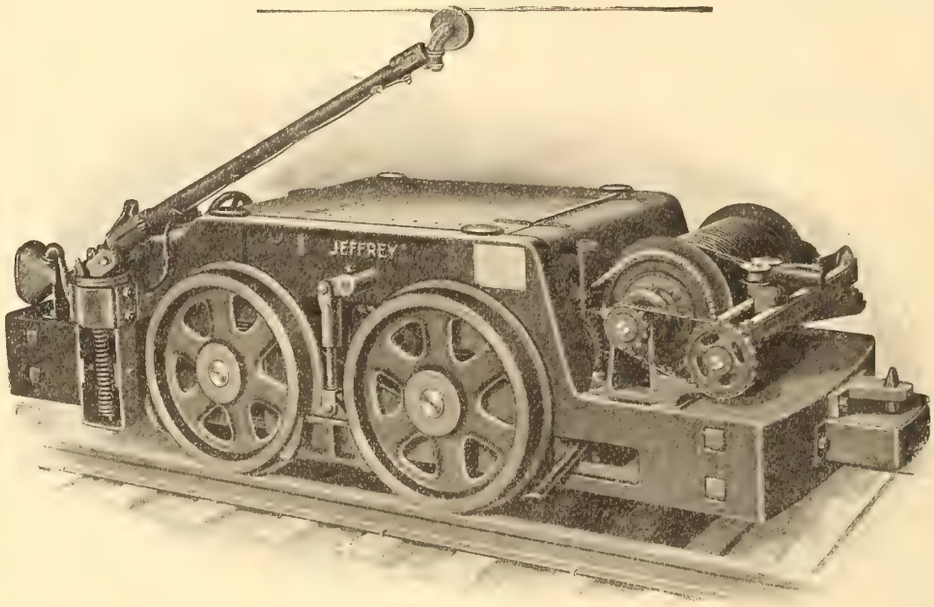

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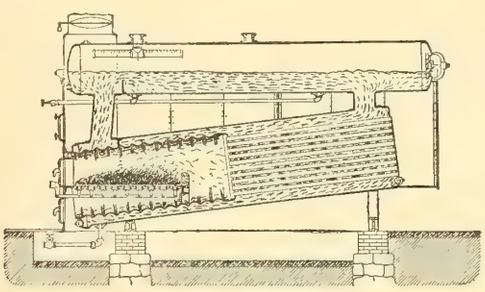

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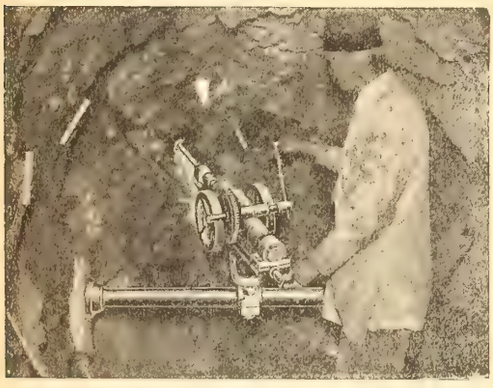

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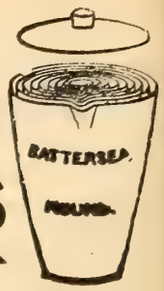

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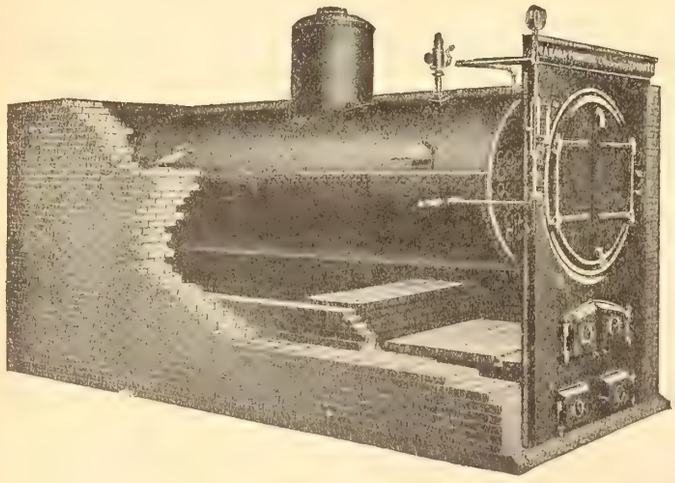

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JOHN E. HARDMAN, Editor. E. GEOFF. STAIRS, Business Manager

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With the January issue of the British Columbia Mining Record, Mr. H. Mortimer Lamb says *Vale* to his readers. In bespeaking for his successor, Mr. E. Jacobs, an equal measure of success, both Mr. Lamb and the British Columbia press do but justice to Mr. Jacobs' proved qualities.

Mr. Lamb has not parted with his whole interest in the *Record*, but by reason of indifferent health, and acquisition of interests in other matters, has decided upon retiring, temporarily, at least, from the confining duties of the editorial chair. The REVIEW'S best wishes are tendered to Mr. Lamb, and its congratulations to Mr. Jacobs, who, it has no doubt, will continue the *Record* on the previous lines of honesty, reliability and fearlessness. *Salutamus.*

Mr. F. T. Snyder, Oak Park, Illinois, writing from Vancouver, under date of January 31st, says that he finds himself unable to prepare a paper on "Electric Furnace Construction," which he had promised for the annual meeting of the Canadian Mining Institute, on March 1st, 2nd and 3rd, owing to matters connected with foreign patent applications, which make it impracticable to publish the details which he intended. He has therefore changed the title of his paper to "Electrical Smelting of Zinc Ores."

The Institution of Mining and Metallurgy has appointed Messrs. R. W. Raymond, James Douglass and T. A. Rickard, of New York, and Dr. John B. Porter, of Montreal, as advisory members of the Central Committee on Standardization. The chief topics in which standardization is sought are (1) Weights and measures in Mining and Metallurgy, (2) Bullion and Assay Values, (3) Mesh of Screens, etc., (4) Mine and Assay plans, (5) Accounts and Cost Sheets, (6) Unification of Mining and Metallurgical terms.

A letter from London and some telegrams from the West advise the REVIEW that the long expected Rossland merging of the Le Roi, Centre Star, War Eagle, Le Roi No 2, Snowshoe and Oro Denoro Mines with the Trail Smelter is to become a fact. Details are not yet arranged, but the main facts are accepted. It is difficult to see bright prospects for the new corporation with the capital which will probably represent the merged properties. The Trail Smelting Works are profit earners, and the Centre Star and Le Roi may be, under new management, but the rest of the combination have no prospect of becoming profit earners.

The Colonial Secretary has recently supplied some data relative to the employment in the Transvaal of imported Asiatic labour, from which some interesting information has been deduced. It appears that the first importation of Chinese appeared at Johannesburg about the middle of June, 1904, at which time the Kaffirs were beginning to leave for their homes in order to avoid the winter of the Rand.

The Kaffirs returned earlier than usual, making their appearance again in large numbers in the month of September so that in October there were 78,491 natives at work. The Chinese numbered about 1,000 in June, but had increased to 13,000 in October.

The most interesting feature of the labour statistics thus furnished is the percentage of Europeans since the advent of the Orientals. Instead of the Chinaman driving out the European, the latter have come in larger ratio. In 1903 there were eight natives to one white man on the pay rolls of the mining companies; in October, 1904, there were only five coloured workmen (Kaffirs and Chinese combined) to one white man. The displacement of the white man by the Celestial is not yet apparent in the Rand.

The Nova Scotia Coal Trade for 1904.

The coal trade of Nova Scotia for the year 1904 disappointed the hopes of those sanguine optimists who predicted an output of five and one-half million tons. The record shows that there was slight, if any, difference from the output of 1903. The shipments to the St. Lawrence very greatly increased as noted in our December issue, and amounted to 1,454,365 tons, an increase of 211,000 tons, but the exports to the United States fell off some 200,000 tons from those of 1903.

One of the reasons adduced for the failure to increase shipments was the severe weather of the spring of 1904, when shipments fell off over 300,000 tons as against the same period in 1903, Another reason given is the tranquil state of the United States market owing to there having been no strikes, and, therefore, no shortage, in Atlantic ports.

All mainland companies, except the Joggins and Acadia, are expected to increase shipments during 1905, while the Cape Breton mines should undoubtedly show large increases. The output of the Dominion Coal Co., which aggregated nearly 2,800,000 tons during the past year, may reasonably be expected to attain figures in excess of 3,000,000 tons this year, and the output of the Nova Scotia Steel & Coal Co. will largely exceed the half million tons of 1904.

The coal trade of Nova Scotia has now reached the point where new markets must be had if increase in shipments is to be expected; what the results of seeking distant foreign markets, now being tested by the Dominion Coal Company, will be cannot be predicted at this time.

Below is given a table of the relative amounts shipped from each colliery during 1904:—

	1904.	1903.	Increase or Decrease.
Dominion Coal Co.. ..	2,780,038	2,802,134	*22,096
Nova Scotia Steel & Coal Co..	496,751	451,993	45,000
Cumberland Ry. & Coal Co..	433,858	435,716	*1,818
Acadia Coal Co..	255,135	337,223	*82,090
Intercolonial Coal Co...	242,144	232,056	10,088
Inverness Ry. & Coal Co.	167,894	165,738	2,156
Port Hood Coal Co.. ..	62,335	77,981	*15,646
Maritime Coal Co.	43,700	19,700	24,000
Minudie Coal Co.	34,500	29,000	5,500
Gowrie & Blockhouse, Ltd.	31,470	24,420	7,050
Sydney Coal Co. (appx.)	10,000	10,000	.....
Other small collieries..	65,000	.....	.....
* Decrease.	4,622,823	4,586,649	

The Outlook on the Rand.

The London Critic of Jan. 14th has a short article on the present condition of mining in the Transvaal which is optimistic, and, we believe, deservedly so. Apart from the so-called Kaffir market, or the vagaries of the brokers dealing in Kaffir stocks, the fact that, the value of the output from the Rand mines during the year 1904 has been the largest on record since discovery, does not seem to have had the effect of restoring that confidence which might have been expected.

Beginning with the small production first recorded by the Chamber of Mines in 1887, some seventeen years ago, the production for 1904 amounted to over £16,000,000 sterling, and in December had reached a monthly figure of £1,500,000 sterling, or at the annual rate of £18,000,000 sterling. The number of producing mines in December was 60, and the number of stamps dropping was 5,300 out of a total of 7,145.

With the supply of unskilled labour up to the standard obtaining before the war (100,000), the introduction of Chinese labour without disturbance, and the increase in development of the newer companies, our esteemed contemporary's optimistic views seem to be well founded, and to be justified by the record and the facts.

The Critic also gives a short history of the Rand which is worth summarizing. In the sixties gold was found on the Tati field, and in 1869 in the Klein Letaba district by Mr. E. Button; in 1872 the burghers passed what has been known as the Transvaal Gold Law, at which time the possibilities of the country seemed to be confined to Lydenburg and De Kaap fields. The notorious Sheba mine was started in 1885, but in 1884 a man named Arnold found gold on the Geldenhuis Farm, near the site of the present city of Johannesburg, and in the same year the Banket was proved auriferous and extensive. Johannesburg was first set apart as a township in September, 1886, and in June, 1887, the first return of the Chamber of Mines was published, which was a yield of 887 ounces from the Wemmer mine; this was followed by the boom which occurred in 1888-'89. After a period of re-action the industry again grew and seven years later (in 1895) there were some forty producing companies. About this time Mr. Hamilton Smith made his famous report to the Rothschilds that the Rand fields contained at least £215,000,000 sterling of gold, and production to date accounts for more than one-half of this figure. The later calculations of Dr. Hatch and John Hays Hammond are familiar to our readers.

The Mining Section of the Canadian Society of Civil Engineers.

The Mining Section of the Canadian Society of Civil Engineers held its regular meeting on the evening of February 9th, at the Society House, when the paper of the evening on "The Mine Fire at Dominion No. 1 Colliery, Glace Bay, N.S.," was read. The paper was the joint production of Messrs. Shirley Davidson and Norman McKenzie, both on the staff of the Dominion Coal Co.

Dr. Porter, president of the Mining Section, read the paper in the absence of the authors, and prefaced its reading with a brief description of the topography and geology of the Sydney coal field, illustrated with some capital lantern slides of the region. After the paper had been read and discussed some further lantern views were shown by Dr. Porter illustrating many of the points alluded to in the paper.

The paper itself dealt with the history of Dominion Colliery No. 1, its mechanical equipment and surface structures, and its development by means of the shafts sunk for coal-winning, ventilation, and for sending down material.

The dip, flow and roof were explained, and the method of handling the drainage water which amounted (before the fire) to 500 gallons a minute. The authors then gave a clear and succinct account of the origin of the fire and of the various steps taken to quench it, and of the final resort to letting in the sea water. This work was described in detail, as was also the method of unwatering the mine after the fire had been entirely put out.

The REVIEW will print this paper, with its illustrations, in its next issue.

The Seventh Annual Meeting of the Crow's Nest Pass Coal Co., Limited.

The seventh annual meeting of the Crow's Nest Pass Coal Co. was held on the 10th of February, when the report for 1904 was submitted to the shareholders.

The Profit and Loss account showed net profits of $406,049, an increase of $95,557 over the profits for 1903, or better than 11 per cent. upon the total capital stock of the company.

The report shows that the company has thriven during the past year. Its tonnage of coal mined increased by 81,000 tons, and the coke exported increased by 78,000 tons.

The credit balance at December 31, 1903, was $1,870,813, which was largely due to the premiums obtained by the sale of new shares; during 1904 the sum of $38,865 was obtained in the same manner.

On December 31st, 1904, there was carried to rest account the sum of $1,764,600, and $347,870 were distributed as dividends during the year.

During the company's year, the sum of $254,000 was spent on improvement account. The sum of $203,320 has been carried forward to the credit of the profit and loss account.

The shareholders must feel very well pleased with the year 1904, and the outlook for 1905 is fully as encouraging.

Iron Production.

The London *Iron and Coal Trades Review* puts the world's output of pig iron in 1904 at 44,575,000 tons, distributed as to production as follows:—

	——Tons——	
	1903.	1904.
Great Britain	8,811,204	8,400,000
United States	18,009,252	16,600,000
Germany	10,085,634	10,150,000
France	2,827,668	2,800,000
Russia (1902)	2,592,282	2,300,000
Austria-Hungary (1902).	1,470	1,600,000
Belgium	1,216,500	1,300,000
Sweden	506,825	500,000
Spain	380,284	350,000
Italy (1903)	43,355	75,279
Canada	265,418	300,000
Other countries	210,898	200,000
Totals	46,420,000	44,575,000

These figures show a decrease of 845,000 tons.

To show how the trade is opening in 1905, the following is excerpted from the *Iron Age*:—

The production in the United States for January, 1905, was the largest monthly production ever recorded. 1,776,500 tons (exclusive of charcoal iron, which amounted to 20,000 tons) of pig iron were produced, the highest previous monthly record being for the month of May, 1903, when the output was 1,713,614 tons. The record for December, 1904, was 1,614,349 tons; January's record, therefore, is 162,151 tons in excess of December's, and is 62,686 tons ahead of the biggest previous record.

This rate of production is in excess of 20,000,000 tons per annum, or double the quantity manufactured by any other country in 1904. The *Iron Age* points out that the record does not represent a full month's output at full capacity, since the weekly output increased from 377,879 tons in the first week to 440,292 in the last week of the month. In addition to this tremendous output, the stocks of the merchant furnaces decreased some 31,000 tons during the month.

The Cons. Cariboo Hydraulic Mining Co., Ltd.

The seventh annual meeting of the Consolidated Cariboo Hydraulic Mining Co., Ltd., was held in Toronto on the 26th of January last, at which the report of the directors and of the manager and auditor were submitted.

The profit and loss account shows that the increase in debt for the season's work amounts to $27,172.08, the balance at debit being $51,707.90 against $24,535.82 on Dec. 31st, 1903. The operating expenses per manager's report were $88,423.75 and the total value of bullion obtained was $85,936.30, making a direct loss in operating account of $2,487.45. The accrued interest on the bonds amounted to $24,000.

From Manager Hobson's report the total operating season was only 89 days, and the reasons of scanty precipitations and adverse conditions respecting the melting of the winter snows are again adduced.

The total water used amounted to 184,889 inches, which washed 1,327,817 cubic yards of dirt, an average duty of 7 1-5 yards per inch. The total gold recovered from this yardage amounted to $84,866.21, or an average yield of 6 38-100 cents per cubic yard. The average cost per cubic yard was 6 65-100 cents, making the loss per cubic yard on working alone about three mills.

Since 1894, the first year in which the former Cariboo Hydraulic Mining Co., Ltd., produced gold, until the close of 1904, a period of eleven years, the yield of this property annually has been as follows, according to the Company's annual reports:—

	Cubic Yards Washed.	Yield.
1894 and 1895..	210,000	$ 65,467.00
1896..	737,940 (Estimated, not given),	124,026,86
1897..	840,130	138,559.74
1898..	385,670	105,141.36
1899..	1,952,535	92,678.93
1900..	1,843,938	350,085.77
1901..	2,420,288	142,273.41
1902..	690,442	61,395.19
1903..	373,000	44,943.70
1904..	1,461,341	85,936.30
	10,915,282	$1,210,503.26

The yardage of 1896 is estimated on the basis of the number of inches of water used, as in the annual report for that year it does not appear. The average value of the gravel for the last eleven years is, therefore, approximately eleven cents ($0.11.09). In the manager's report account is taken of the older Chinese workings, the yield from which is assumed at $900,000, and the average computed at 16 8-10 cents per cubic yard.

More water is asked for, and estimates are given for a supply of 5,000 inches to be taken, one-half from the west slope of the Morehead Range, and one-half from Spanish Lake, the total cost of which is estimated at $490,000. As the Company already has the very large capital of $4,000,000 issued, and has been eleven years without realizing a dividend out of a total production of one and a quarter million dollars, it is difficult to see in what shape inducement can be made for the investment of another half million dollars.

The half dozen millionaires who have hitherto paid out of their own pockets the bulk of the money required, are amply able to continue, but they must be different to other men if they do not require some more definite inducement than the promises which hitherto they have been taking at par.

What strikes the ordinary shareholder is the incongruity between the annual optimistic reports (of the manager and of nearly a dozen experts during the last ten years) and the continued failure to meet fixed charges. Some shareholders have desired a separation of technical from financial control, but have been told the idea was impossible; just why, the REVIEW is unable to see.

CORRESPONDENCE.

The Two Per Cent. Tax in B.C.

To the Editor.

Sir,—For at least four years the mine owners in British Columbia, and of the Kootenays in particular, have been at war on the subject of the two per cent. tax. The matter has been freely discussed, and at times much recrimination has been indulged in, but as yet no satisfactory settlement has been reached. One of the first acts of the McBride government, which came into power early in 1904, was to pass a new bill known as the Assessment Act, which did not in any way deal with the objectionable two per cent. tax. In consequence of general complaints as to the working of the new Assessment Act, a committee was appointed to enquire into its operation, and the order appointing this commission made no reference to the tax, nor to any matters outside of the scope of the Assessment Act. In spite of this deficiency the commissioners took evidence from two gentlemen who were connected with the mining industry, and whose testimony was favourable to the tax and to its continuance in its present form. When this evidence appeared in print the British Columbia Mining Association called meetings of its various branches and decided to lay before the Government some evidence which was adverse to the tax and its operation. Whether the Association's course will benefit the mining industry, or obtain the redress sought for, may reasonably be doubted, but certainly it has again raised the whole question, and it may lead to its final settlement in one form or another.

The tax as at present imposed yields to the Government of British Columbia two per cent. upon the gross value, less cost of freight and treatment, of ores extracted from British Columbia mines, and the revenue from this source amounted to $65,000 in 1904, a sum which cannot for one moment be considered as an onerous tax upon the industry. The chief objection to the tax, however, is to its incidence, which undoubtedly causes it to press unduly upon small mines producing ores of low grade. It is doubtful whether it is more unequal in this respect than the majority of taxes, since it is impossible to adopt methods of taxation which will be absolutely uniform in their pressure. For instance, in the case of a low grade mine producing from 50 to 100 tons a day at a very small margin of profit, the tax may appear to be heavy, yet in the case of the lowest grade mines in the Kootenay country (those belonging to the Granby Company) which three years ago paid but $600, under this tax law, the amount can only be regarded as trivial for a concern capitalized at $15,000,000, and with $1,000,000 actually expended in plant. There is the further consideration that nothing is more calculated to prejudice outside investors against coming to the Province of British Columbia than the fact that mine owners from time to time raise a hub-bub about a tax which yields such a small amount; it is the poorest kind of advertisement.

A strong objection of those who wish to abolish the tax is that it is levied upon mines which are not making a profit, and, in the resolution which has been endorsed by the Provincial Mining Association and forwarded to the Government, a suggestion is embodied that, before estimating the value of the ore upon which the tax is to be calculated a deduction should be permitted equal in amount to the cost of producing the ore in addition to the cost of freight and treatment, so that the tax should be levied upon *net* instead of gross values.

The Association has expressed itself as willing to have the percentage increased if the incidence is altered in the manner suggested. Taking the total amount of profit reported by the various mining companies in the province for last year, it is found that, for the Government to realize as much under the tax method suggested by the Mining Association as under the old method, the percentage would have to be raised from two per cent. to five per cent., and it is understood that this increase is not objected to by the Association. The Government has had such a recommendation before it previously and has rejected it, for the reason that it would be difficult, if not impossible, to ascertain a fair charge for the cost of production, and it contended that such method of levying the tax would open the door for so much dispute that the Government would always be in litigation with the mine owners. While there may be some truth in this, I cannot consider it as a valid objection. This same difficulty already exists in connection with assessment of every kind and would have to be overcome by employing competent expert assessors. However, there is one contention of the Government which is entitled to consideration, and that is, that the exigencies of finance demand that the mining industry should contribute definite amounts to the revenue of the province and if, under the new method suggested, the income fell considerably below the amount at present realized, it would become necessary for the province to increase taxation in other directions, which would then have the effect of taxing other industries and capital for the benefit of the mines. At present the Provincial Mining Association has not explained how it proposes to overcome such an objection; the most practical suggestion offered was made in the House last session by the member from Nelson, who proposed to tax the mining industry in British Columbia on the same basis as is done in the adjoining Western United States and the same as in the Old Country, viz.: to levy the tax of mining companies on the real estate occupied and on all permanent improvements on the same, such as plant, machinery and buildings, and at the same time to maintain a two per cent. tax levied upon net instead of upon gross value as at present. The strong objection urged against this is that it would involve large payments by mining companies which had extensive and expensive plants, which plants might never pass beyond the experimental stage and become profitable, and that such a tax would be even more detrimental in discouraging capital than the present one.

These are the only two practical suggestions that have been made which are likely to reconcile the objections of the mining companies and the financial exigencies of the Government. Of the two suggestions the former involves the least difficulty, and, as the Mining Association has expressed itself as favourable to the scheme, it is to be hoped that this much vexed and talked of question may be settled, and that at the next session of the Provincial Parliament the necessary changes in the law may be made, and one of the most fruitful topics of dispute in British Columbia mining circles may be removed.

WILLIAM BLAKEMORE.

Nelson, B.C., 20th Jan., 1905.

[The REVIEW regrets that it cannot endorse the suggestion above stated by our correspondent. The suggestion is that the tax be assessed upon the *net* value of the ore, i.e., upon the value remaining after costs of production (mining, management, freight and treatment) have been deducted from the gross value of the ore. All efforts to assess on the *profits* of mining companies have hitherto proved futile and embarrassing. The Government of British Columbia has, as our correspondent points out, already delivered itself upon the very points we mention—" it would be difficult if not impossible to ascertain " *not* " a fair charge for cost " applicable to all mines, but, *what the actual cost is in each producing mine.* No one of our British Columbia friends would undertake to say that the costs of production in the Boundary country are as high as in Rossland, or that costs in the Slocan and in East Kootenay are on a parity. Therefore, we disagree with our correspondent in his statement that " this can hardly be a valid objection." It is the most valid of *all* the objections. Nor could the objection be overcome in any " usual manner," nor by " expert assessors." In all cases of taxation the courts are open for the man who considers his tax oppressive, and it requires no long experience in this world to recognize the probability of the courts being so overwhelmed with disputed cases and appeals as to deplete, rather than to fill, the treasury. If the financial needs of the B. C. Government demand an increase of the amounts at present paid in to the treasury, the change suggested by our correspondent and the Association will not, for years if ever, produce that increase.

Taxation of mines has, by experience, been found to be best based upon the area and value of the mining lands owned, such value being dependent upon the annual *gross* production, cost and value of improvements made (which includes all buildings, machinery and plant) and value of franchises exercised, such as water powers, etc. Departure from these safe lines has hitherto brought disaster; we do not believe British Columbia is an exception.—Ed.]

Mining Schools.

To the Editor:

Dear Sir:—The articles on the practical side of mining teaching in two or three of your recent issues bring up an old yet ever new subject of the utmost importance to our engineering schools and to the mining profession at large. The mining laboratory and the summer school in their present form are distinctly American devices, and both have been in use in some of the older colleges in the United States for almost a generation. It is only within a very few years that certain otherwise admirable institutions of learning have ceased to turn out mining graduates who had never seen a mine, and whose knowledge of mining and ore dressing was based solely on such ideas as could be conveyed by diagrams and lantern slides and much lecturing.

Scores of young men, with no more practical training than that outlined above, have ultimately achieved success in professional life, and the fact goes far to prove the paramount importance of theoretical teaching. Success for such men has, however, been reached only through great difficulties. The theoretical graduate had to begin his practical work too late, and he often got little help and no sympathy from his fellow-workmen. Even managers were often disinclined to help college men, and thus the way to success was made slow and arduous. In face of these difficulties many of the men who entered the field were forced to give up the fight and turn to other lines of engineering work, and thus the mineral industry lost hundreds of men who, under happier conditions, would have ultimately proved of great use.

Now our conditions are very much better, and every mining school possesses laboratories, and has some scheme for giving the students practical experience in the field. Furthermore, the sentiment of mine managers and even of miners has changed very much for the better, and any student or young graduate who is willing to work is now sure of receiving every reasonable help in beginning his practical career. More remains to be done, however, towards perfecting our methods, and it may be profitable briefly to discuss these methods as they are now employed by some of the best schools.

The work of the mining department of a university may be divided into four parts:—

1st. *Elementary work in Mathematics, Physics, Chemistry, etc.* This pure science is a foundation on which all the rest must stand, and must be taught well and thoroughly. In general, pure science teaching should be the same for all branches of engineering, and it is usually undesirable for a student to decide definitely which branch he will follow until the divergence of the courses in the latter years of his university life forces him to make a choice.

2nd. *Advanced theoretical work in the special subjects of mining, ore dressing, geology, metallurgy, assaying, etc.* This work to be effective must be carried on in connection with the help of laboratories, and must be supplemented by experience in the field. The teachers should be, so far as possible, men who have had practical experience. The opinion is occasionally expressed that purely practical or professional men should be engaged to do this teaching, but, aside from the actual difficulty in the way of getting such men to give the necessary time, there is the further trouble that thoroughly practical men are seldom sufficiently experienced in teaching to do effective work with boys whose training thus far has been purely academic. Occasional lectures by such men are of immense value in stimulating students, but in general the best results are obtained when the professors are men who have had some experience in the field, and who keep in close touch with the profession by means of travel and occasional work.

3rd. *Laboratories.* Those in such mining schools as Columbia, McGill, the Institute of Technology, etc., are now magnificently equipped. At McGill there are facilities for experimenting both on a large scale and in a small way with every important ore dressing and metallurgical process, and with almost every type of machine or furnace. The difficulty now is not that the students have no opportunities to study the processes and to use machines, but that they are tempted to try and do too much, and so run the risk of losing fundamental principles in their effort to master details. One of the most important and difficult parts of a professor's work is to decide just what operations should be conducted on a large

scale by his class, what may be done in a small way on small machines, and where to stop this demonstrating and to start his men off on individual work. This latter is, after all, the best means we have for thoroughly interesting students, and my own experience is leading me to give less time than heretofore to set tests and even to large scale operations, but to get each man at work as early as possible on some individual problem—some ore to concentrate, or cyanide, or smelt—and in the same connection to require him to work out general designs of a plant for his process, with estimates of costs and running expenses. This extension of individual work, combining theory and practice, is, in my opinion, one of the most important developments of modern education.

4th. *Practical Work.* A mine owned or operated by the school is often spoken of as a desirable addition to the "laboratory" equipment, and such mines have actually been tried in several cases, notably at Camborne in Cornwall, in certain German government schools, and recently at Birmingham and elsewhere. A mine to be worth studying must be a practical example of mining, worked by miners and operated at a profit or in expectation of a profit. A few students or even a professor in such a mine need do no harm, and conceivably might even might be of some use, but probably very few mining men will seriously advocate the operation of mines by professors and students, with the assistance of a few miners, as a means of showing students the real thing.

Probably a better system is that inaugurated many years ago by Columbia, and now used in modified form by McGill and no doubt by other schools. As developed by McGill, the college course consists of four academic periods of eight months each, with intervals of four months each devoted in part to recreation but largely to obligatory work. In each of these so-called vacations the students are required to attend summer schools, first of surveying for two years, and then of mining for at least one year. In the first, the students work all day and every day for a month in actual field surveying, under a proper staff of instructors; in the second, they are required to spend a month or six weeks in some important mining region, and mines and mills are visited and studied in accordance with a scheme systematically laid out in advance by the professor, who, with his assistants, remains with the party for the whole period, and thus sees that the observations of the students are made as intelligently as possible and are properly recorded.

These obligatory summer schools are not all that is expected of the men. Nearly three months of each summer remain, and every effort is made to persuade the students to undertake actual work for part or all of this time each year. No visits to mines, however carefully planned and carried out, can put the men in actual touch with their future profession, and these periods of real work, with real miners, and of living in miners' boarding houses, are probably worth more than any other single factor in making the teaching effective. It is therefore very satisfactory to be able to report that, for several years, the managers of the mines visited in British Columbia, Nova Scotia, Michigan, etc., have provided places at more than living wages for all men in our classes, and that no less than ninety per cent. of our students have taken advantage of the opportunity, and, for the time, have become real miners.

The above outline of our methods has been given, not because I consider it ideally perfect, but because I wish to interest our mining men. They could aid us, and, in the end, benefit themselves by helping us find our students summer work where they can at once get good experience and earn money. I am confident that every considerable mine, mill and smelter could well afford, as a mere matter of business, to place with the heads of one or two mining schools definite offers of "jobs" for the summer for one or more students. Several companies have already done this with me, and in this way have not only aided greatly in the work of technical education, but have got in touch with a certain number of young men who can afterwards be considered in connection with any permanent position that may be offered.

J. B. PORTER.

McGill University, Department of Mining Engineering,
Montreal, February 14th, 1905.

Flues and Flue Dust at Anaconda.*

By C. H. McDOUGALL.

The problem of recovering the solid matter from the gases emitted by furnaces is one that, during past years, has received a great deal of attention at Anaconda, and more especially since the erection of the new smelter in 1902, as then the effects of the arsenic liberated in the smelting process became more apparent.

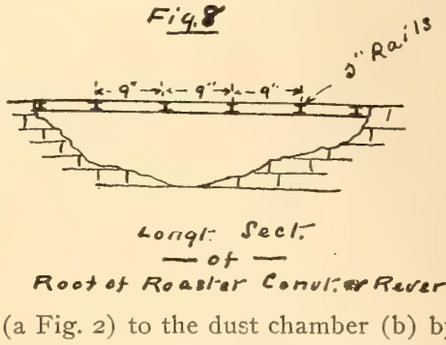
At the time of construction it was thought that the height of the hill on which the plant was placed, together with steel stacks 200 feet high for the reverberatories, roasters, blast furnaces and converters, would lift the smoke to such an elevation as to prevent it doing any injury in the adjacent valley. However, on commencing operations it was found that the prevailing winds more than counter-balanced the benefits thus obtained and the deposition of poisonous matter on the neighbouring farm lands gave rise to much litigation.

To remedy this, as well as to save the solid matter containing a high per cent. of copper, the plan used at the old works of building a brick flue from the furnaces to the top of one of the surrounding hills, and there erecting a stack, was adopted and improved upon with the result that, at present a flue giving the largest settling area and a stack with the greatest capacity yet attained, are giving the most satisfactory results and the old trouble with the arsenic has been completely overcome.

Fig. 1 in the accompanying sketches shows the arrangement of the various parts of the plant and the flues carrying the gases to the stack. Lengths given for the different parts are horizontal measurements, and do not denote the true distances the gases flow before entering the stack, on account of the slope on which the flues are built.

Blast Furnace Flue.

Commencing at the blast furnaces and following the gases as they escape they are conveyed from the upper part of each



furnace (a Fig. 2) to the dust chamber (b) by means of a flue (c). Seven of these flues enter the dust chamber, one from each

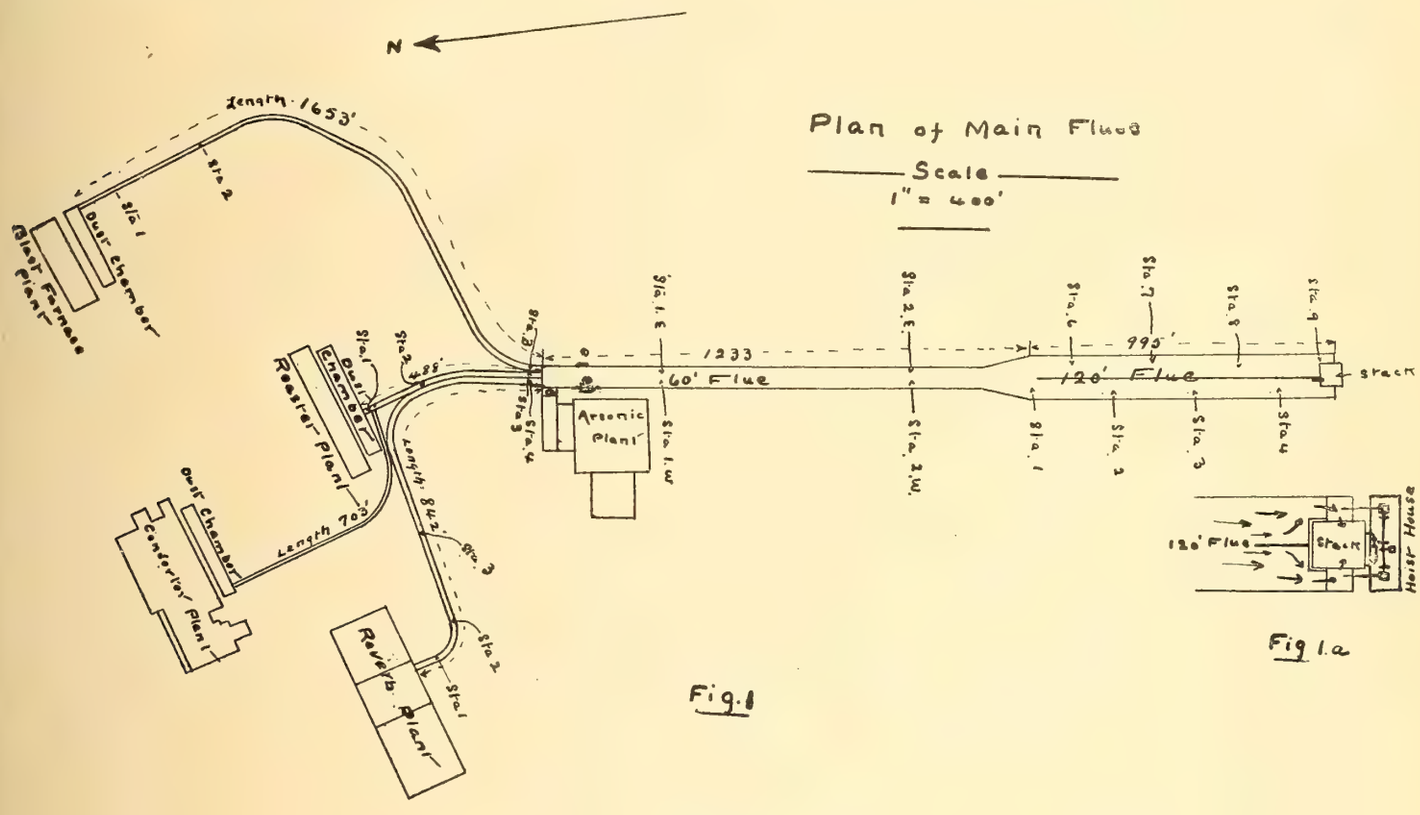
* A paper read before the December meeting of the Mining Section of the Canadian Society of Civil Engineers.

furnace, and they are all provided with hoppers, as shown at d, d2, d3, to allow for the drawing off of any flue dust that may accumulate. These hoppers are opened once every week and the dust found is returned to the furnaces.

The dust chamber itself is 38 feet wide and 275 feet long; the walls are brick with steel framing, and the roof at the present time is constructed of steel rails, placed 9 inch centres, with bricks between as shown in the construction of the roaster flue (Fig. 8). Cement and expanded metal have been tried with poor results, the former being acted on by the sulphuric acid in the gases to such an extent that in a short time the roof became unsafe. In all cases the latter method of construction has been replaced with rails, bricks and mortar. The chamber proper is built about 9 feet from the ground, thus admitting of a means of drawing off the flue dust into cars; the hoppers (g, g2, g3, g4), are arranged in four rows lengthwise of the chamber; the roof and floor are supported by four rows of 6 inch columns equally spaced across the chamber and placed 8 feet centres for the length of the structure.

Formerly there was a partition at right angles to the flow of the gases and extending the full length of the dust chamber —save for the openings at the ends—thus compelling the gases to traverse a considerable distance before entering the flue. On examination it was found that practically all the dust was deposited on the side next the inlet, so that at the time of the construction of the flues this partition was removed and the gases now pass directly to the flue.

Flue dust accumulates at the rate of from 60 to 70 tons in 24 hours, and is the coarsest material thus obtained, pieces of

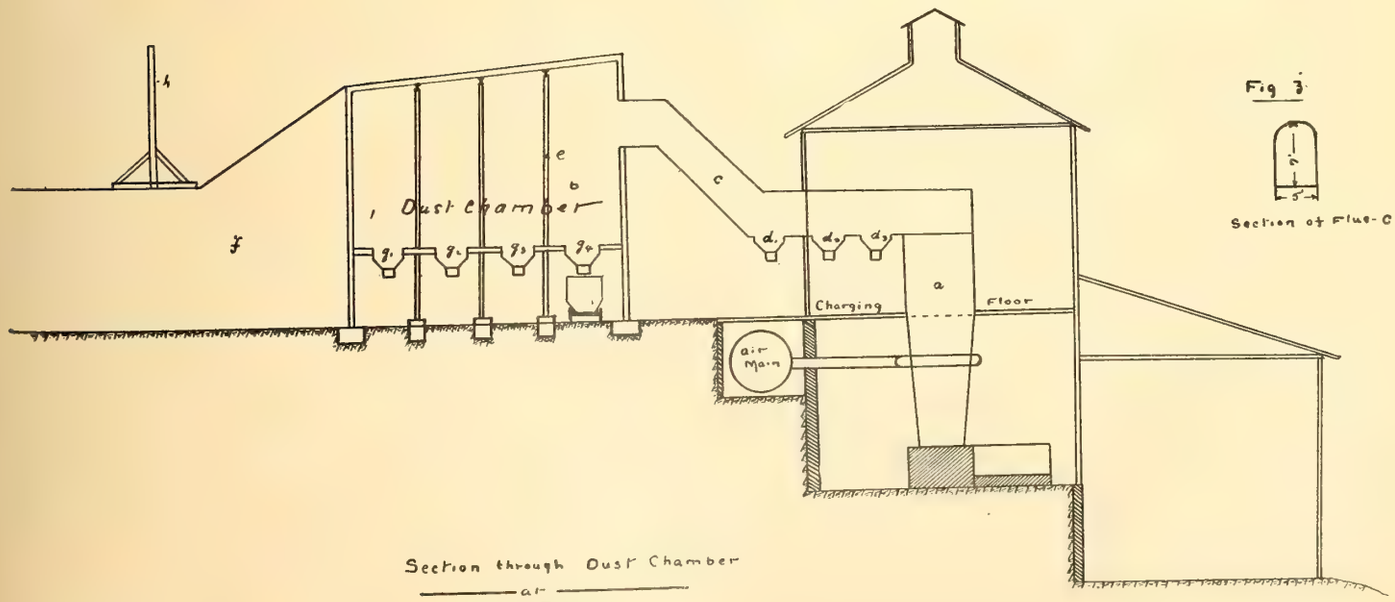


Plan of Main Flues
Scale
1" = 400'

Fig. 1

Fig. 1a

Fig. 2

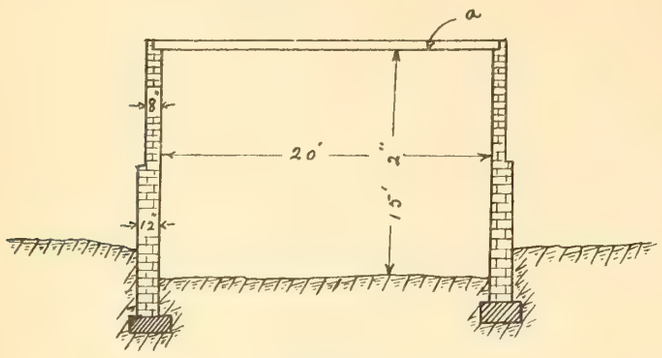


Section through Dust Chamber
air
Blast Furnaces

Fig 3

Section of Flue-C

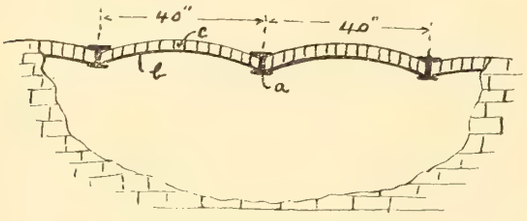
Fig No. 4



Section
of
Blast Furnace Flue
Scale 1" = 12'

limestone and coke being abundant. Assays show it to be lower in copper and arsenic values than the dust from the other chambers.

Fig 5



Longit. Sect
of
Roof of Blast or 60' Flue

The dust drawn off is sent to the reverberatories. The flue commences at the north-east corner of the chamber and has a total length of 1,653 feet to its point of juncture with the reverberatories and roaster flues. This extreme length is due to the necessity (in construction) of passing around the end of the ore bins; in the first half the sides are exposed, but in the latter part the roof alone is uncovered. A cross section is shown in Fig. 4, the walls are brick, 8 inches in thickness at the top and 12 inches at the bottom, the inside height is 15 feet 2 inches and the width 20 feet.

The roof is constructed of 5 inch I beams, placed 40 inch centres (see a, Fig. 5), between these corrugated iron roofing (b), is fitted in the form of an arch 4 inches high at the centre, the ends of the arch resting on the lower flanges of the I beams; on top of this sheeting the bricks are laid as shown at (c).

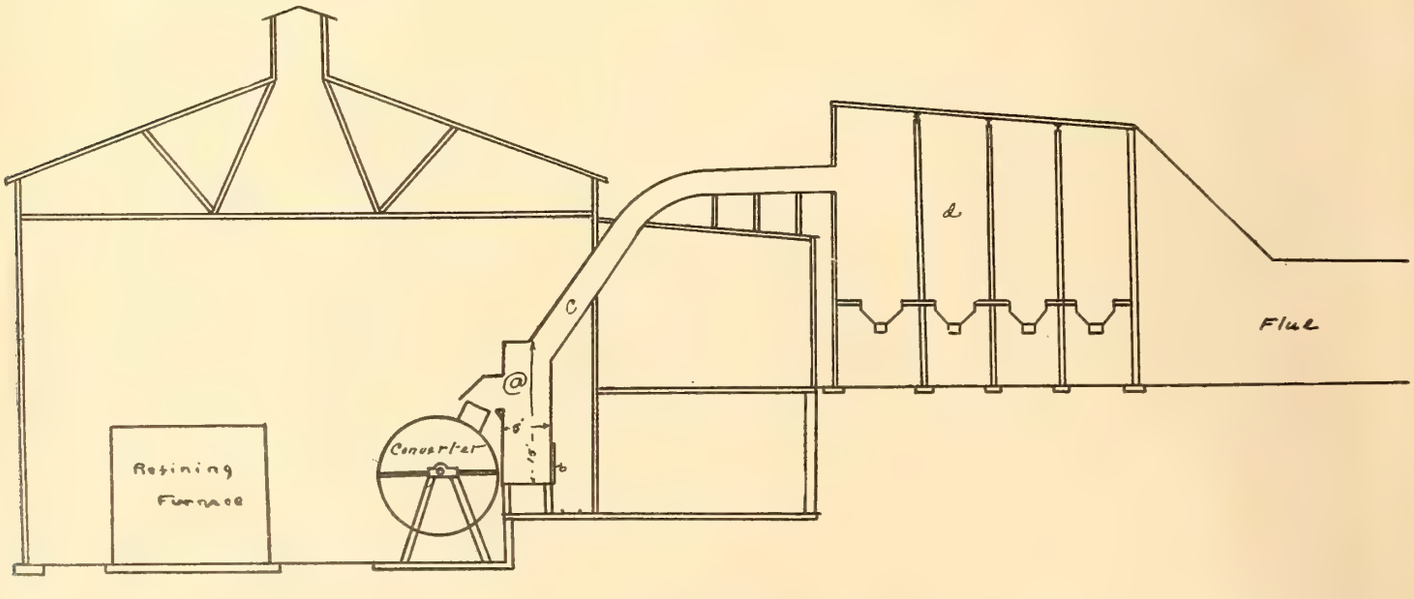
The inside area is 303 sq. ft. Blind doors are built in the sides in this as also in the other flues, every one hundred feet, for the purpose of removing any flue dust that may become an obstruction, but, so far, these doors have not been used, and at present there is little or no dust in the flue. This was ascertained last June when openings were made in the roofs of all the flues at intervals of 200 feet; three in each section for the blast furnace, reverberatory and roaster, two for the converter, five for 60 ft. and ten for the 120 ft. flues. The depth of dust was found at each opening by means of a greased iron rod and a sample was taken out with a long handled scoop. The average depth for the blast flue was two inches, and the greatest was at the bends where the dust had drifted. All the samples were of coarse material, coke and limestone being very abundant, as in the dust chamber. The estimated total quantity was 773 tons with an assay as follows:—

Arsenious oxide	1.6 per cent.
Copper	7.4 " "
Silver	6.8 oz. per ton
Gold	0.035 " " "

The velocity of the gases was 2,542 feet per minute, and the volume 771,060 cubic feet per minute.

Drafts and temperatures are given on Sheet A. Inconsistencies in the temperatures are not uncommon and are due to the varying number of charging doors open, and to the changing conditions of the furnaces. Plots, as in the accompanying sheet, have been made showing the relation of draft

Fig. 6



Section
at
Converter Dust Chamber

and temperature in the flue to the number of charging doors open.

As a means of regulating the current in the flue two doors of ⅜ inch boiler plate, each half the width of the flue, are hung to a frame at (h) Fig. 2, these can be loosened at once to cut down the cross sectional area, but at present are kept well drawn out.

Converter Flue.

Although the amount of solid matter escaping from the converters is large, only a small part of it is carried into the flue; a large part being caught in the boxes placed at (a) Fig. 6, from these it is shovelled into cars through a door and recharged into the converters.

From each of the nine boxes (one to each converter) steel flues lead to the dust chamber, (size 364 feet by 38 feet). The latter is constructed on the same plan as the one before described, and the dust that collects here is drawn off at the rate of from 40 to 50 tons per day and sent to the reverberatories.

The flue, Fig. 7, is the smallest of the ones described, being only 8 feet wide by 8 feet high. For the greater part of its length the roof alone is exposed, this is constructed of steel rails placed 9 inch centres with bricks between. A sectional view is shown in Fig. 8.

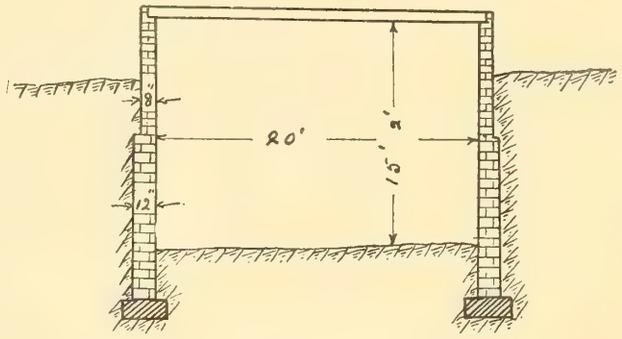
The drafts and temperatures are extremely variable and the relation of the former to the number of converters blowing is shown on an accompanying sheet; the readings plotted were taken in the flue just beyond the dust chamber and show a range of temperature of 263 degrees F. The inconsistency shown at the time 4-22 is due to the fact that the two converters blowing had not time to warm up after receiving a fresh charge. The temperature of the converter flame does not materially increase for about ten minutes after the blowing begins, but from then till the time of skimming it gradually rises. The length of the flue to its point of juncture with that from the roasters is 703 feet and at no place on its bottom could enough dust be found to admit of taking a sample.

Steel doors are hung at the top of the downtake from the dust chamber as in the case of the blast furnace.

Roaster Flue.

The roasting at Anaconda is done in 48 McDougall furnaces, Klepetko and Evans design, placed four abreast in a building 98 feet wide; across the top of each row of four furnaces extends a steel flue (a Fig. 9) connected by two pipes as at (b) and (c) to each of the furnaces, at (d) and (e) hoppers are placed; the ones marked (d) drain the dust into the discharging hoppers of the furnaces, and the ones at (e) drain into the dust chamber (f). The latter is 264 feet long and 38 feet wide and is constructed like that of the blast flue.

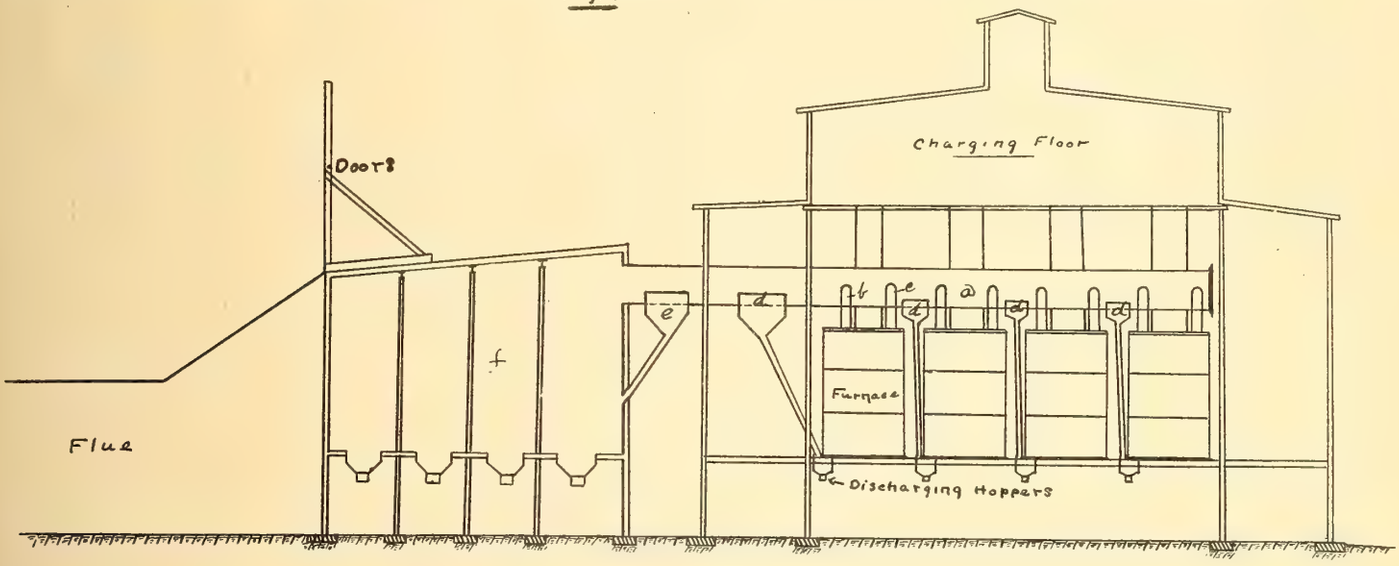
Fig No. 10



Section of Roaster Flue
Scale 1" = 12'

The amount of material taken out per day and sent to the briquetting plant is between 40 and 50 tons.

Fig. 9



Section of Roaster Plant & Dust Chamber

The roaster flue has the same cross sectional area as the blast flue (Fig. 10) and differs from the latter only in the construction of the roof, which is the same as is described under the converter flue, the latter joins the roaster flue at a distance of 60 feet from the dust chamber.

Owing to the fineness of the feed, and the nature of the treatment, a great deal of material escapes from the furnaces.

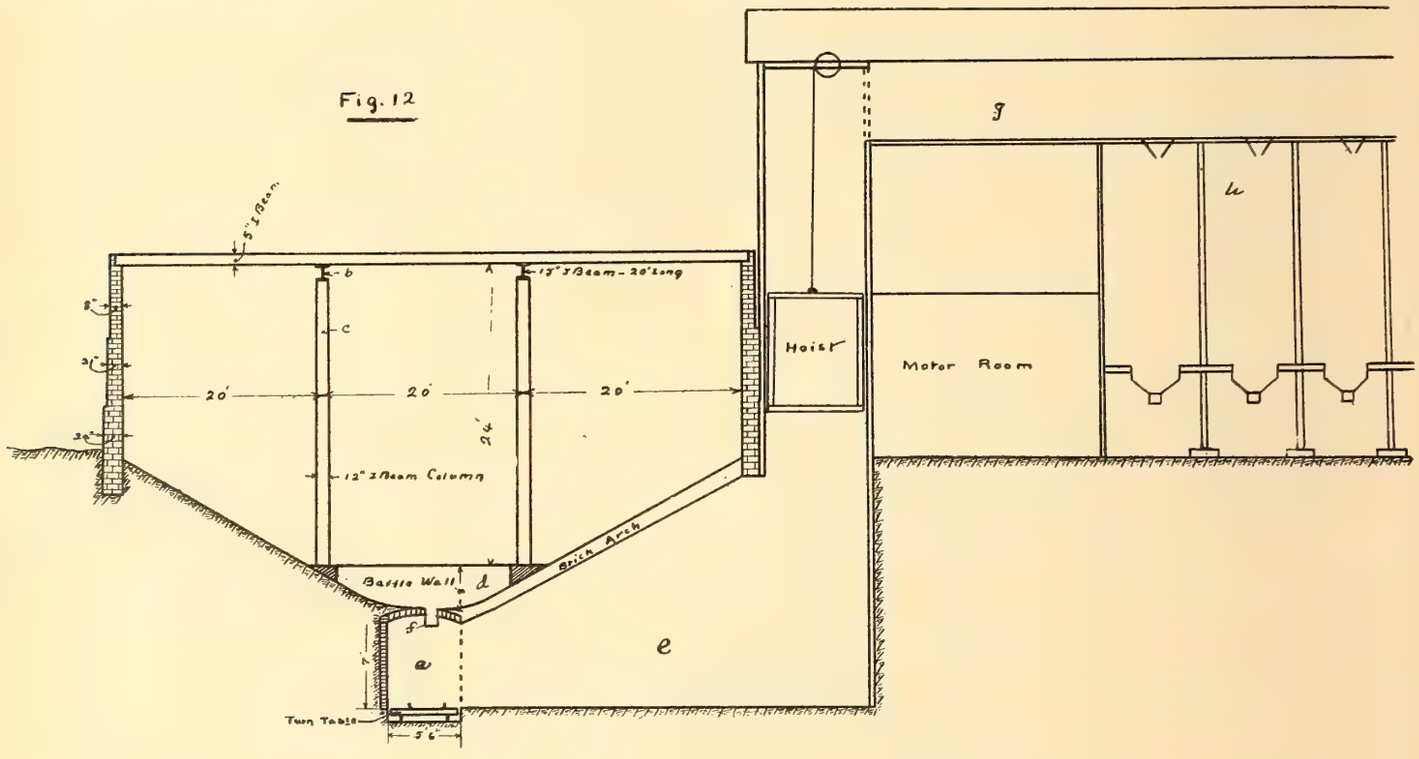
The depths of dust found in the flue varied from 6 inches to 4 feet, and the total quantity was estimated as being 590 tons, the assay in copper and arsenic being higher than that given in the dust from the blast flue. The total length of the flue is 488 feet, the velocity of the gases 3,582 feet per min., and the volume in cu. ft. per min. is 943,208. These quantities include the gases from the converter flue.

Reverberatory Flue.

This differs from the ones previously described in having no dust chamber at the beginning; the gases pass from the different furnaces, arranged as in Fig. 11, by the passages marked (a) to the Stirling boilers at (b) and (c) and from the boilers into the flue (d.) This plan of using the heated gases for the purpose of generating steam has proved a decided success; one furnace giving off enough heat to generate 800 H.P. (700 H.P. in b and 100 in c.) The boiler tubes are not coated to any great extent by the solid matter present, so the cleaning of tubes is not a serious drawback to this method of utilizing the waste heat. During this operation the gases are sent directly into the flue through the downtake (e). The average temperature of the gases when they leave the boilers is 357 deg. C. This is at least 300 deg. C. lower than that of the gases when sent direct into the flue.

The reverberatory flue is the same in cross sectional area and construction as the roaster (Fig. 10), and at the time of examination it contained no flue dust. The velocity of the gases was 2,483 feet per minute.

Fig. 12



Section of 60' Flue
Through Hoist at Arsenic Plant
Scale 1/2" = 1'

Sixty Foot Flue.

At the commencement of this part of the flue the reverberatory blast and roaster flues meet and merge into one, and it is then called the Sixty Foot Flue from its inside width. This differs from the ones previously described in that besides acting as a passage for the gases it also, on account of a greater cross sectional area, lessens the velocity and thus gives the solid matter a chance to settle. For this reason the flue is built with a hopper shaped bottom (Fig. 12); beneath the flue is a tunnel (a) for the purpose of removing the fine dust.

The walls are brick, 20 feet high and vary in thickness from 18 inches at the top to 24 inches at the bottom. The roof is built in the same way as that of the blast flue, but on account of its width it is supported by two rows of 15 inch I beams (b) resting on 12 inch columns C. The latter are 20 feet from the sides and 20 feet apart lengthwise of the flue. The area of the cross section is 1,717 square feet and the total length 1,233 feet. The sides of the hopper bottom are bedrock, sloped to 30 degrees, this giving a depth of 37 feet in the flue over the tunnel; baffle walls (d) 8 feet high at the middle are built every 20 feet to aid in catching the dust.

The tunnel is 5½ feet wide by 7 feet high and has brick side walls and an arched brick roof; at intervals of about 12 feet spouts (f) are placed for the purpose of drawing off the flue dust into cars, the latter have closed tops and an inlet through a bag or nozzle that can be fitted over the spouts. This method of loading prevents the dust from escaping into the tunnel.

The operation of the car is described under the One Hundred and Twenty Foot Flue.

At the north end of the Sixty Foot Flue is the hoist into the arsenic plant, (a Fig. 1), this is shown in section in Fig. 12. The cars are dropped down to the turn table, disconnected and run on to the hoist, through the passage (e). The hoist is operated by a motor in the motor room and conveys the cars to the floor (g), there the dust from the Sixty Foot Flue is stored in bins (h) preparatory to being drawn off and taken to the briquetting plant. The dust from the One Hundred and Seventy Foot Flue is run direct to bins and then to the charging floor of the arsenic plant, here it is roasted in Bruckner furnaces that communicate with condensing chambers, the waste gases passing through into the Sixty Foot Flue.

Varying depths of from six inches to six feet of dust were found in the flue, the average assay being eight per cent. arsenious oxide and ten per cent. copper.

Velocity of gases in the flue is about 1,300 feet per minute and the volume 211,268 cubic feet per minute.

Cold air is admitted into the flue through openings at e and e Fig. 1 as a means of regulating the temperature.

One Hundred and Twenty Foot Flue.

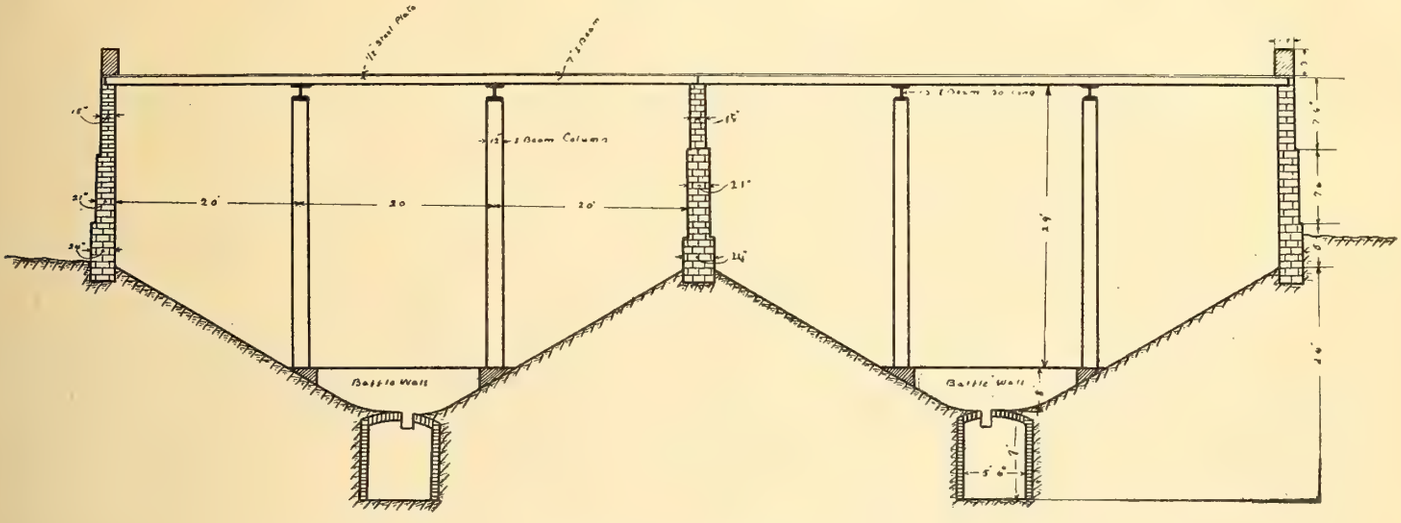
In this part of the flue the area of the 60 ft. flue is doubled and it is really a flue formed by building two sixty foot flues

side by side; the outside walls are of the same thickness, and the partition between the east and the west side is built as shown in Fig. 14. In the construction of the roof, however, there is a decided difference, as in this part, to permit of greater heat radiation, instead of bricks the covering is ⅛ inch steel plate riveted to 7 inch I beams spaced 40 inch centres. These are supported by 15 inch I beam columns. The tunnels and baffle walls are constructed as before described; the length of the flue measured horizontally is 995 feet but, owing to the difference in elevation of the ends (350 feet), the actual length is about 1050 feet. The velocity of the gases is about one-half that given for the sixty foot flue.

The flue dust here is nearly all deposited in the part next the furnaces, and as the stack is approached the depth decreases until on the last few sections enough could not be obtained to form a sample. Usually the copper assay is lower and the arsenious oxide slightly higher than from the Sixty Foot Flue.

The two tunnels shown in Fig. 14 merge into one just below the contraction of the flue to sixty feet. The cars are worked by cables attached to drums in the hoist house just south of the stack (Fig. 10a). The cables are wound on the drums in opposite directions so that when the shaft revolves one car goes down and the other up. The power is supplied by a small electric motor, but gravity does most of the work. The hoist is run either 8 or 16 hours per day, with an average removal of five cars of dust per hour.

Fig. 14



Section of 120' Flue
Scale 12' = 1"

At the south end of the flue is the three hundred foot stack on a 44 ft. square base; details of the construction can be found in the Engineering and Mining Journal of Sept., 1903. Every month samples of the smoke are taken to make sure that no solid matter is escaping; these samples are taken by means of a line of pipe and a fan sending the smoke through a tightly woven asbestos bag.

Flue Leaks.

In February, 1904, it became apparent that a large volume of air was leaking into the flue through the sides and the roof; to determine the amount the following test was carried out:— A wooden frame 12½ feet long and 4 feet wide was covered with stout painted canvas, a hole 2½ inches in diameter surrounded by a wooden ring being left at (b) for the purpose of holding an anemometer. This frame was set up at intervals on the walls and roofs of the different flues, air being prevented from getting inside in any other way than through (b) by cementing the edge of the frame to the wall as at (e). When set up it can be seen that all the air that would leak into the flue through the fifty square feet covered must pass through the anemometer, the latter being wedged and puttied into the hole (b). Readings were taken for five minute periods until the velocity of the flow was determined. From this result the amount of air passing into the flue per square foot at each set up was determined. One hundred and fifty different places were tried, and from the results thus obtained and the area of the exposed walls the total amount of cold air leaking in was estimated.

Before this test had been undertaken an experiment on flue leaks had been carried on as described in the appendix. From the results thus obtained it was seen that too much air was being let into the flues, so to remedy this the whole of the exposed parts were given a coat of cement, with the result that when again tested it was found that the leaks had been reduced nearly five per cent. The draft at the furnaces was in this way materially increased. To remedy the rise in temperature in the flues, resulting from the exclusion of cold air, openings were made in the sides of the sixty foot flue, and at the present time sufficient cold air is let in at these places to keep the temperature of the one hundred and twenty foot flue down to the required point.

Flue Velocities.

The matter of obtaining correct flue velocities was one that for some time offered considerable difficulty, as an anemometer could not be used on account of the temperature and dust. Finally, by checking the pilot tube against the displacement of the blowers its reliability was established. Since then an exhaustive set of tests on the different flues has been carried out and the results obtained have been very satisfactory. The ones given in the foregoing are from the first set obtained.

In this sketch of the flue system at Anaconda, I have not attempted to give any figures for costs as these can be obtained from the Engineering and Mining Journal of Sept., 1903, along with the methods used in constructing the flues and stack.

Appendix.

Effect of Leaks on Chimney and Furnace Draft.

To determine the effect of leaks in a flue upon the quantity and velocity of gas passing through the furnace, and also up the chimney, an experimental plant was made of iron pipe. A number of 1 inch and of ¼ inch holes were drilled in the flue. A kerosene lamp with Argand burner served for a furnace and was so enclosed that all the air passing the lamp had to go through a 2½ inch Biram anemometer, as did also all the gas discharged from the top of the chimney. The conditions as to the lamp, the area of the intake and the discharge area from the chimney were the same for all tests. The results are as follows:—

	Velocity in feet per minute.		Temperatures.			
	Intake.	Discharge.	Near Lamp.	Base of Chimney.	Top of Chimney.	External Air.
All holes in flue closed	140	..	311°F	172°F	97°F	72°F
	..	154	318°	179°	99°	72°
Total area of flue leaks 16.3 p.c. of flue area	92	..	319°	124°	89°	..
	..	194	321°	122°	88°	..
Total area of flue leaks 32.6 p.c. of flue area	86	..	303°	120°	88°	..
	..	207	300°	114°	88°	..
Total area of flue leaks 48.9 p.c. of flue area	83	..	275°	110°	84°	69°
	..	194	283°	108°	85°	69°

These figures show that, up to a certain point, when openings are made in the flue, the velocity in the chimney increases, but beyond that point it decreases again. Every opening in the flue, however, decreases the quantity of air passing through the furnace.

The apparent explanation is that, with a tight flue the openings through the furnace are too restricted to pass the quantity of air of which the temperature conditions are capable with a *free* opening. With a certain amount of leak the temperature conditions are still sufficient to carry more air than can pass through the lamp, and the excess is taken in at the leaks. A point is finally reached, however, where the temperature in the chimney is too low to carry the quantity of gas previously passed, and beyond this point the flow decreases.

The results with all the holes in the flue closed show that even then there was a slight leak, amounting (when corrected for temperature) to approximately four per cent.

The temperatures given above were observed at about two inches from the top of the iron flue. At the bottom the temperatures were 10 to 20 degrees less.

[At the time that Mr. McDougall's paper was read before the Mining Section of the Can. Society of Civil Engineers there was published in The Mining World an excellent description of the new "Washoe Reduction Works," at Ana-

THE WASHOE REDUCTION WORKS, ANACONDA, MONTANA, THE LARGEST OF ITS KIND IN THE WORLD.

conda. By courtesy of that paper we reproduce one or two photographs of the works, and an abstract of its article.]

The Washoe Reduction Works, Anaconda, Mont.

This plant, which is the largest of its kind in the world, lies some 25 miles north-west from Butte in the Warm Springs valley. The works include a sampling mill, concentrators, roasting furnaces, reverberatory meeting furnaces, blast furnaces, a briquetting mill, converters and a refinery. The number of employees varies from 1,500 to 2,000.

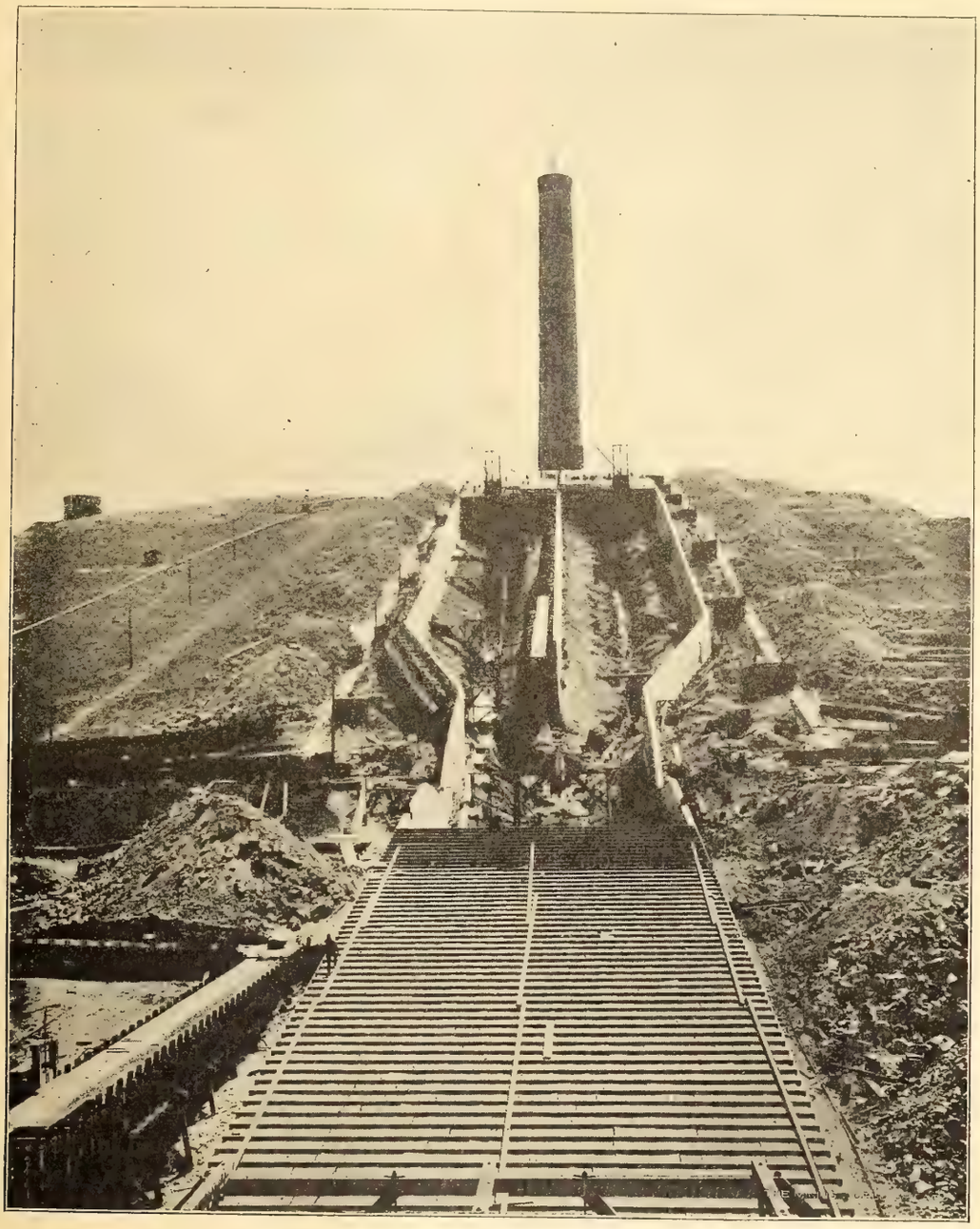
The sampling mill is used as well for the ores from the Anaconda Mines as for custom ores, all the first class ore going through, and every fifth car of second class ore. The great bulk of material handled is second class ore.

The concentrating plant has the power house in the centre, with four independent sections on either side. The frame is steel, and each section has a capacity to treat between 800 and 900 tons daily, giving a total tonnage capacity of over 7,000 tons when all sections are in operation. After crushing the ore is screened to four sizes, viz.: diameters of 22mm, 7mm, 5mm, and 2½mm. The coarser sizes go to Harz jigs, the finer to Evans jigs, and the undersize is fed to hydraulic classifiers which return their classification to other Evans jigs.

The middlings from all jigs is re-sized or re-ground as is necessary, and re-fed; the process closely resembling that of the Lake district in the large amount of middlings constantly re-handled. For the overflows from the classifiers Wilfley tables are used, and the final slimes are briquetted with fine ore.

Each section of the concentrator consumes 300 H.P., for which two triple expansion Corliss engines, rated at 1,500 H.P. each, are required.

The roasting furnaces are of the McDougall pattern, containing 6 superposed circular hearths; each furnace has a capacity of about 40 tons of concentrates in 24 hours.



VIEW OF THE 60 FT. AND 120 FT. FLUES DURING CONSTRUCTION, AND OF THE LARGE CHIMNEY WHICH HAS INSIDE DIAMETER OF 30 FT., WITH WALLS 5 FT. 8 INCHES THICK AT THE BASE, TAPERING TO 13½ INCHES NEAR THE TOP.

The smelting reverberatories each take a charge of 20 tons, and approximate a capacity of 300 tons in 24 hours; their fuel consumption is about 1 ton of coal (Wyoming) for 3.5 to 4.2 tons of ore and flux. The furnaces are 102 ft. long by 20 ft. wide; the slag is skimmed into running water, granulated and carried off; the matte is run into ladles which are hauled to the converters.

The blast furnaces are each 180 inches long by 56 inches wide at the tuyeres, and 13½ feet deep from tuyere holes to top of jacket. The capacity averages from 400 to 500 tons of charge per diem. The matte and slag run together into forehearths or settlers, 14 feet in diameter and 4 feet deep, from which the slag overflows and is granulated, and the matte is periodically tapped into ladles which are conveyed to the converters. There are seven of these water jacketed furnaces.

The converters are of the horizontal, or barrel, type and are nine in number, the charge for each varying from seven to twelve tons of matte according to the condition of the converter lining, which is siliceous. The first blow oxidises most of the iron and the second removes the sulphur; each blow averages an hour in duration, after which the hot metal is transferred to one of three refining furnaces where oxidation of impurities is effected by blowing in air through a pipe plunged into the bath. After this partial refining the metal is cast into anodes for electrolytic refining which now is all done in the East.

The Mines of Ontario.

By W. E. H. Carter, B.A.Sc.*

(Continued.)

Outside of these areas bordering the north shore of Lake Huron the only important known occurrences of copper to the west, until western Ontario is reached, are those in the small areas of Nipigon rocks at Point Mamainse, Michipicoton Island, and on the islands and shores around Thunder and Black Bays, in all of which it exists in the native state. At Mamainse it is found in the form of straggling masses and thin sheets in calcspar veins, and at Michipicoton as grains in an arenaceous ash-bed. Amygdaloidal traps and conglomerates comprise the copper-bearing rocks of the Black Bay area, the native grains usually filling amygdaloidal cavities and small fissures.

Considerable mining for copper has been done at all these places and, judging from the statements of those who worked there, extravagance in operation and maintenance were the chief reasons the work did not longer continue. At Mamainse development was confined mainly to sinking shafts, the deepest being about 300 feet. The copper content of the ore varied considerably, but is said to have averaged about 0.75 per cent. A complete and large mining plant was installed, and an ore dressing mill of 180 tons daily capacity. This work progressed from 1883 to 1884.

Development of the Michipicoton deposits has gone on intermittently from the year 1860, and most energetically from 1880 to 1887, the work then largely confined to one location at the west end of the island where, out of the several sunk, one shaft reached a depth of 520 feet and another 360 feet. The drifting aggregated about 1,500 feet, said to be largely in stoping ground.

*Paper read at the Sixth Annual Meeting of the Canadian Mining Institute.

It may be mentioned in connection with these Ontario mines that several of the native copper mines on the south shore of the lake in Michigan are profitably mining ores that run on the average as low as 0.6 per cent. copper.

At Black Bay the amygdaloids have been tested in a small way during the past several years, the work going on at one mine at the present time. No definite results as to the value of the field as a copper producer have yet been obtained.

Farther west, however, at Round Lake, near Kashabowie, on the new O. & R. R. section of the C. N. Ry., and about 80 miles beyond Port Arthur, one of the pioneer mines of the area, the Tip-Top, has been under active and systematic development for the past two years or more. Four levels have been opened and stoping ground prepared, the output during the past year of ore, mainly from development work, amounting to a little over 4,000 tons, carrying by assay about 8 per cent. copper. If suitable arrangements can be made the company, I believe, intend erecting a small furnace either at the mine or at Port Arthur to smelt the Tip-Top ore and any other that may be raised from the other copper properties in the area, some of which (although unknown quantities as yet) were prospected recently. The silver ores, with their calcitic gangue, may also be purchased for flux and for their silver content, while coal or coke is to be obtained from the C.P.R. bins at Fort William. The project is not new; but up to the present no mine or mines has had enough ore in sight to warrant the venture.

NICKEL MINES.

A great deal has been written, in one shape or another, on the nickel areas surrounding Sudbury, which makes it unnecessary to say more than a few words here, and that with regard only to the present situation and the condition of the mines. There have been latterly but two operators in the field, the Canadian Copper Company, subsidiary to the International Nickel Company, and the Mond Nickel Company. The operations of the former far exceed all others in the business, both in the mining and the smelting departments, and are even now being magnified; while Dr. Mond's works have closed down for the present with a large stock of matte on hand.

The old Copper Cliff mine of the Canadian Copper Company, still the richest in copper of any in the district, has produced latterly about 1,000 tons per month from the bottom levels, at between 1,000 feet and 1,100 feet depth. The ore has there broken up into irregular bodies, making diamond drilling necessary in their location. Another substantial shoot of ore was recently found in this way and is now being mined. The ore averages about 12 per cent. combined metallic content (10 per cent. copper and 2 per cent. nickel).

No. 2 mine holds good as ever in the bottom levels, at about 400 feet depth, the ore averaging about 3 per cent. nickel and 2 per cent. copper. The now abandoned open pit, measuring 217 feet in depth with an average diameter of about 120 feet and nearly vertical walls, far exceeds in size any other of these open workings at the present time. The mine is now in shape to produce 400 tons or so of ore per day with its one shaft and double skip road.

Mines Nos. 3, 4 and 5 and the Stobie are in shape to produce in large quantities, especially the first and last, when that particular class of ore in each becomes needed at the smelter.

The output of ore for a while back has come chiefly from the Creighton mine, the most recent and valuable acquisition of the company, the present rate of mining there giving over 800 tons per day. The main unbroken ore body contains, by esti-

mate from the findings of thorough diamond drill exploration, over 3,000,000 tons of ore of a 6.5 per cent. or better nickel-copper content (about 2 of nickel to 1 of copper). There are extensions to this ore body which will considerably increase the total quantity. This estimate accounts for the ore body to a depth of but 300 feet, this being the maximum vertical depth bored by the drill, at which the width of the deposit was about 225 feet.

In order to economize in the roasting and smelting operations the entire surface works have been re-arranged, not at once but gradually during the past two years, and now a new or third smelter plant is about completed to replace both the others and also the Ontario Smelting Works near by, where the low grade matte is at present partially refined. There will be only two blast furnaces, but they will have a combined capacity of at least 1,100 tons of charge per day, and from them the molten matte will run direct to the bessemer converters in the same building and be raised to a content of about 80 per cent. nickel-copper. The accessory plant, the buildings and the new power generating station and, in fact, the general arrangement of the whole, is all after the most approved ideas, regardless of any necessary expense. Detailed descriptions of this new smelter plant appeared at the first of the year in several of the engineering periodicals and may also be referred to in the Thirteenth Report of the Bureau of Mines of Ontario.

With the completion of the new works all ore will be roasted in the one new or No. 3 yard. This has already grown to such an extent that it covers a distance of a mile or so from end to end, with heaps piled two deep and close together. Instead of the old dimensions of 40 feet by 80 feet plan by 10 feet high, the size of the heap has been reduced to about 25 by 40 feet plan by 6 feet high, with the expectation that it will roast better and in about one-third the time, that is, in from one; to one and a half months.

The Victoria nickel mine before closing down reached a depth of 500 feet, after which diamond drill holes were bored from the bottom and from the two stopes on either side of the shaft, and the ore found to continue down to still greater depths. At some future date we may hope to see this mine again figuring in the list of producers. Since the commencement of smelting at the company's plant near the mine something over 5,000 tons of bessemerized matte containing about 80 per cent. combined nickel and copper has been produced; but only a part of this has so far been refined into the pure metals at the company's refining works in Wales. The Mond Nickel Company mined and raised ore from the North Star mine also during the past two years, shipping the same to its furnaces at Victoria.

All other mining on the nickel range has latterly been curtailed simply to exploring for other ore bodies, the work no longer limited to the vicinity of the Sudbury area but reaching out to the boundaries of the field.

With such immense and valuable ore bodies as exist in these nickel mines, producing considerably more than half the world's supply of the metal, it seems unfortunate that we Canadians should derive so little benefit from it in its final utilization. Why not have at least one of our pieces of money coined out of nickel? This, besides enlarging the limited market for nickel, would help pay due tribute to the splendid mineral resources of the Province.

IRON MINES.

Iron mines are in operation in scattered localities from one end of the Province to the other. The numerous occurrences of both magnetic and hematite in the Archean rocks of Eastern Ontario have already been brought to the notice of this Society, and as only a few of the mines have recently produced any ore, not much information can be added. The difficulty in the way of working these iron bodies is largely a matter of price, too low a margin of profit accruing at the present value of the abundant supply of ore from the Minnesota and Michigan mines, in competition with which ours must enter. When mined for its own consumption by a blast furnace company, as in the case of the Radnor mines in Renfrew, the property of the Canadian Iron Furnace Company, a satisfactory profit arises over buying foreign iron. The Radnor mines have produced over 25,000 tons of magnetic ore of good quality since the beginning in 1902. The ore body occurs in and is somewhat banded with a formation of micaceous gneiss. Its strike and dip are well defined.

Amongst the other mines in the eastern counties which have been doing anything of account towards raising ore may be mentioned the Moore at Eldorado, the Calabogie, the St. Charles and the Mineral Range Iron Company's properties. These last show some of the finest and largest iron ore bodies in this whole area; but for reasons mentioned above, and for lack as yet of satisfactorily cheap railway connections, steady operation and ore shipment has been delayed for the past two or more years.

The mining industry throughout eastern Ontario is not a little handicapped by this lack of adequate transportation facilities. In western Ontario the number of railroads is considerably less than here, but the want is not so greatly felt since most of the mines are of gold or silver, the product of which is easily handled. Here, however, most of the mining is for ores which have to be shipped in the crude state, and, therefore, require railroads right to the mine if possible. The needs of the mines appear at last to be forcing themselves on the powers that be, both railway companies and the Government, with the result that certain badly needed connections and extensions of present roads, such as the C. O. Ry. and the I. B. & O. Ry., are about to be constructed, and possibly a new road or two may be laid out.

The magnetic iron deposits or veins in the Laurentian gneiss and in the eruptive greenstone dikes in the gneiss of the Parry Sound district have within the last year received considerable attention by diamond drill exploration and a little mining. Magnetic surveys have frequently indicated ample quantity, but so far the necessary development has been deferred. The veins although of good quality have been found of somewhat irregular size and continuity.

About 25 miles north of Sault Ste. Marie two mines, the Loon Lake and the Williams, are being opened up on an iron range in which specular iron of excellent quality occurs. At the former there has already been raised 1,500 tons or more of ore averaging about 50 per cent. iron with almost no sulphur or phosphorus.

The ores of the Temagami Lake and Hutton township areas, consisting mainly of banded magnetite and silicious material have not been mined to any extent yet. A railroad to them is a first necessity, and this the Temiscaming & Northern Ontario Railway now under construction will supply to the former area.

In the Michipicoton area iron mining ceased in the summer on account of the financial troubles of the Consolidated Lake Superior Company of Sault Ste. Marie. The Helen mine alone has produced ore; but exploratory mining and drilling on other parts of the range give promise of finding

other merchantable ore bodies. The Helen has produced to date about 850,000 tons of ore. Much has already been written concerning this mine (7) making further mention unnecessary here.

Along the P.A.D. & W. Ry. west of Port Arthur, on Hunter's Island and vicinity; along the Atikokan River and Steep Rock Lake; along the Mattawin River; at Loon Siding, C.P.R., 20 miles northeast of Port Arthur; and in the vicinity of Nipigon Lake, iron ore, both magnetite and hematite, occurs, and has during the several years past undergone rather extensive explorations by drilling and surface stripping at all these places without, however, any mines as yet opening up. Descriptive reports of these areas may be found in the different recent volumes of the Bureau of Mines, wherein also the different schemes of exploitation and the carrying out of the same are recounted. As will there be seen diamond drilling was favored and wherever possible adopted. The spasmodic energy, more or less characteristic of the work, did not provide for any extended periods of unproductive exploration so that, the first attempts not exposing any very large bodies of ore, not much has to date been accomplished towards proving the value of the outlying ranges. During the latter end of this winter the Wiley Bros. of Port Arthur, sent their drill north of the C.P.R. to explore their iron claims on the range which runs northeasterly past the lower end of Black Sturgeon Lake, just southwest of Nipigon Lake. This is good work. When the Nipigon & St. Joe Railway makes connections with these lakes no doubt the iron ranges extending easterly from Nipigon Lake will also be again explored, but on that occasion with a little more permanency than formerly, it is hoped.

The four blast furnaces, one at Hamilton and the others at Deseronto, Midland and Sault Ste. Marie, give market for the ore in our own country. The furnaces at Radnor, Quebec, have also taken a good deal of Ontario ore. There was a project on foot during the winter to erect another furnace at Port Arthur, Ont., to smelt iron from the Atikokan magnetite deposits together with any hematite which might be found on the various other ranges, and if necessary a certain amount of Mesabi ore, to make a foundry pig iron for the growing Canadian market farther west. No doubt such a plant will be erected sooner or later.

LEAD AND ZINC MINES.

These two metals complete the list of economic metalliferous products of western Ontario. Their important occurrences are confined to two areas, one that of Dorion township and vicinity and the other farther east along Lake Superior, a few miles north of Rossport. In the former both galena and blende are found, separately and intermixed in califerous veins, and from one carrying principally blende the Ontario Lead & Zinc Company, of Superior, Wis., has during the past year raised and shipped several hundred tons of ore. One of the old veins first mined 20 years or more ago for lead only was also worked again. The veins form a prominent feature of the country on account of their usually great width of from 10 feet to 30 feet. They traverse the Animikie rocks in connection with eruptive granites and diorites or other green schists which are well developed in bosses through the former system of rocks.

In the zinc-bearing area northeast of Rossport protracted mining work has progressed on one property only, the Zenith mine, where blende was discovered in 1881. The very intermittent development produced several thousand tons of ore averaging about 45 per cent. zinc, which was from time to time shipped to Belgium for treatment. The zinc refineries in the United States though much nearer gave a smaller profit. The ore has simply been gouged out with no attempt at systematic development of other possible bodies. A not very extensive eruption of coarse diorite probably of Huronian age interrupts at this point the Laurentian gneisses and granites of the north shore, the clean blende ore filling fissures as lenticular masses in the diorite. This and the other similar prospects in the area comprise the only known occurrences of merchantable sized bodies of blende in the Huronian system in Canada, for which reason it has a pointed value as indicating the possible existence of similar lodes in these rocks where elsewhere developed.

In eastern Ontario, about 30 miles north of Kingston, a vein of blende in the crystalline limestones was found about two years ago as a new economic mineral of that part of the Province, and has been mined since from the surface down profitably, on, however, the comparatively small scale of 1,000 tons or so of 46 per cent. zinc ore a year.

One of the old lead mines, the Hollandia, in Hastings county, has during the past year been re-opened after an idle period of a number of years. Complete new mining equipment has been installed and a concentrator; the old lead smelter will be made to answer the purpose for a while longer. The galena occurs in a matrix of calcspar as an ore body typical of a great number of other galena deposits throughout a belt from Lanark and Frontenac counties west to Haliburton; but on account of the irregularity of occurrence of the galena in lenzes and pockets in the matrix of the veins they have hitherto not been mined at all continuously or systematically. This Hollandia mine is the first one to erect a lead concentrator in the Province. With the additional low grade ore which may now be profitably mined, and with the Dominion Government's bounty of ¾-cent per pound of lead in the pig on all lead ore mined and smelted into pig in Canada, it should in the same way be possible to make paying propositions out of others of these deposits of galena.

IRON PYRITES MINES.

The occurrence of large deposits of iron pyrites (8) in lenzes, chimneys and veins in the talcose (chloritic) schists of Hastings county has become well known, for the past three years mining having progressed steadily on one or more of the bodies with a total production in the neighborhood of 15,000 tons of ore, averaging between 40 per cent. and 43 per cent. sulphur. All of this has been shipped to the United States for use in the manufacture of sulphuric acid. Recently mining commenced on several additional deposits in the same area in and about Madoc township, and might profitably be extended to any of the numerous other known occurrences in this part of the Province which lie near one or other of the railroads, since the ore brings at the mine from $3.00 to $3.50 per ton.

In the Michipicoton Mining Division a deposit of pyrite of apparently considerable proportions, also associated with soft cloritic schists, was bored through by diamond drill below the bed of the unwatered Boyer Lake at the Helen iron mine, while hunting for extensions of the hematite ore body. The weathering and oxidation of the pyrite by which the Helen hematite resulted had not proceeded to this depth, the original

(7) Bureau of Mines, Vol. XI.

(8) Bur. Mines, Vol. XI., pp. 199, 295-296; Vol. XII., p. 139.

mineral remaining unaltered. This pyrite may prove to be a greater asset to the owners, the Lake Superior Power Company, than its secondary hematite product might have been, providing a source of sulphur for the manufacture at Sault Ste. Marie of the sulphurous acid used in the sulphite pulp works. Ton for ton at the mine it is worth about a dollar more than the hematite ore.

In the vicinities of Rossport and Schreiber, along the north shore of Lake Superior, pyrite has been found (9) at a number of points and mined, but at only one property near the latter place was ore raised and shipped. Pyrhotite is associated with it occasionally, as also small values in gold. It occurs as veins with lenticular characteristics in the diorite areas which pierce the Laurentian gneiss of this north shore region, and therein differs from most of the other deposits in the Province, of which the country rock is a talcose or chloritic schist.

In the western end of Ontario, beyond Lake Superior, massive veins or bodies of pyrite are frequent, confined as a rule to these green hornblende and chlorite schists and altered trap schists. Practically only exploratory mining has been done on any of them so far, the ore raised at a few not amounting in all to a good shipment. The better known occurrences are on Brule Creek (10), a tributary of the Kaministiquia River; near Dryden, C.P.R.; at Nickel Lake (11), C. N. Ry., Watten township; and at Steep Rock Lake (11), C. N. Ry. The most recent finds were made in the vicinity of this last lake during 1903 while boring with the diamond drill for iron ore. One body at a small lake called Straw Hat measures, according to the statement of Mr. R. H. Flaherty, who did the drilling, about 175 feet in width, ¾-mile in length, and contains on the average about 23 per cent. sulphur, with, however, a central lenticular band varying in width from a few feet to 20 feet, and assaying 41 per cent. sulphur, which could be profitably mined. The ore consists of pyrite interbanded with cherts in a country of green hornblende and chlorite schists.

The banded iron ores of magnetite and hematite of the northern range in the vicinity of Lake Temagami appear to have originated from deposits of pyrite similarly to the Michipicoton and other iron ores of western Ontario, and, if so, development of the iron will in time, no doubt, disclose merchantable pyrite ores in this area also. Quite a number of undeveloped prospects for pyrite unconnected with any iron ore are already known in this most interesting and rich mineral district, and one of them on Net Lake, along the line of the T. & N. O. Ry., is now being mined. Another on James Lake assays from 42 per cent. to 44 per cent. sulphur.

(To be continued.)

New Coal Mining Regulations for the North-West Territories.

A series of regulations relating to coal mining in the North-West Territories, recently issued by the Department of the Interior, Canada, are of importance. The regulations relate to the disposal of coal lands on that portion of the Blackfoot Indian reserve which lies south of the Bow River, and set forth in detail the conditions upon which coal-mining leases may be obtained in that section. Briefly, the effect of the new regulations is as follows:—

The sanction of the Superintendent-General of Indian Affairs is required before an applicant for a coal-mining lease on the territory in question may make a survey, and in no case may a survey indicate a surface area of more than fifteen sections of land, containing in all not more than 9,600 acres. All surveys are expressly subject to the approval of the Superintendent-General. A lease must not be for a term exceeding twenty years, and not more than 640 acres may be occupied in surface operations during that term. The right to construct roads, building, bridges, etc., is included. A sum not less than $3,000 must be paid by the applicant to the Superintendent-General on or before the execution of the lease. In the case of there being two or more applicants for the same location, the location will be leased to the applicant who tenders the highest fee therefor. In addition, an annual rental of fifty cents per acre for all land used or occupied in surface operations must be paid, together with a royalty of *fifteen cents* for every ton of marketable coal raised. All pits, shafts, roads, etc., must be kept fenced off. Mine operations must be begun within one year from the date of the lease on penalty of cancellation. Cancellation will also ensue, if at the end of the third year from the issue of lease the royalty on the coal mined does not amount to at least $500. It is further required that no injury to surface, fences, crops, etc., must be done in carrying on mining operations, without proper compensation, the amount to be settled by arbitration in cases of dispute. A breach of agreement in any particular is made punishable by forfeiture of the lease, in which case no compensation for works, buildings or improvements is to be allowed to the lessee.

No mine now or heretofore worked by the Indians may be included in a demise, and lessees are required to purchase all marketable coal delivered at the mouth of the shaft, being the output of Indians' mines, at a rate of $1.50 per ton. The bonus payable to the Superintendent-General prior to the execution of the lease is to be held in trust for the Blackfoot Indians. The provision relating to the fencing of pits, roads, etc., is also designed with the object of preserving the Indians of the reserve from damage. It is added that no one may be employed by the lessee of a coal mine location whose drunkenness, immorality, gambling, etc., may render him undesirable as an associate with the Indians.

An important provision affecting the rights of settlers is that which enables actual settlers to buy at the pit mouth whatever coal they may require for their own use, though not for purposes of barter or sale, at a price not to exceed $1.75 per ton.

(9) Bur. Mines, Vol. VII., p. 78; Vol. X., pp. 89, 109.
(10) Bur. Mines, Vol. X., pp. 107-108.
(11) Bur. Mines, Vol. XI., pp. 296, 308-309.

According to the January issue of the Labour Gazette, there were in 1904 a total number of 894 fatal accidents in industrial labor in Canada, of which 106 are charged to mining. The greatest number (273) are charged to "Railway Service," and agriculture beats mining with a total record of 110. There were during the same year 2,095 accidents which were not fatal, of which only 117 are charged to mining. Mining ranks third in the list of fatal accidents, and tenth in the list of non-fatal accidents. In percentage, 11.8 per cent. of all the fatal accidents are chargeable to mining, and 5.5 per cent. of the non-fatal. These figures do not bear out the usual conception of the extra hazardous occupation of the miner.

Mining Share Market.

Mining stocks have been very dull during the past months, and prices are practically unchanged. Transactions are few; the only sales worth recording being in Centre Star, which, after selling at 19, recovered its normal price of 21. In the Industrials, there has been limited trading, but the result of the month's business shows little change in prices. In the opinion of the "street" the public is not in the market, and speculation is reduced to trading amongst "room operators."

The following list shows the quotations for the week ending Monday, February 20, as supplied to the Review by **Robert Meredith & Co., 57 St. Francois Xavier Street, Montreal:—**

Par value of shares.		Asked.	Bid.
.10	Canadian Gold Fields Syndicate	.05	.04
5.00	Cariboo Hydraulic	—	—
1.00	Centre Star	.22	.20
1.00	Deer Trail Consolidated	.02	—
1.00	Giant	.03½	.01
10.00	Granby Consolidated	5.12½	5.00
10.00	Montreal and Boston	1.25	1.37½
1.00	North Star	.02	—
1.00	Payne	.02	.01
1.00	Rambler Cariboo	.15	.12
1.00	Republic	.03½	—
1.00	St. Eugene	.45	.40
1.00	War Eagle	.11½	.10
1.00	White Bear	.04	—
100.00	Nova Scotia Steel (common)	67.12½	66.75
100.00	Ditto ditto (preferred)	—	—
100.00	Dominion Coal (common)	66.00	64.75
100.00	Ditto ditto (preferred)	—	—
100.00	Dominion Iron and Steel (common)	18.25	18.00
100.00	Ditto ditto ditto (preferred)	65.00	64.00
——	Ditto ditto ditto (bonds)	82.37½	82.25

PERSONALS.

The estate of the late Sir Isaac Lowthian Bell has been assessed at £768,676, of which £674,317 is net personality.

Mr. James McEvoy, geologist of the Crow's Nest Pass Coal Company, has also been appointed its land commissioner.

Major Duncan Stewart is visiting his former home at Hamilton, Ont. Major Stewart is now Registrar of Mining at Johannesburg, South Africa.

Mr. George Gillies, of Toronto, a director of the Athabasca-Venus Company, was in British Columbia during January to look after his mining affairs.

Mr. J. H. Plummer, president of the Dominion Iron & Steel Co., has been seriously ill at Sydney, C.B., but is now recovering.

Mr. C. V. Wetmore, of Sydney, C.B., has been elected president of the New Brunswick Iron Co., Limited.

It is announced from Toronto that James Cronin has been appointed to succeed E. B. Kirby as the general manager of the War Eagle and Centre Star mines, at Rossland.

The Hon. Wm. Ross and Mr. Alf. Morrison have asked the County Council of Port Hood for a free right-of-way for the railway of the Margaree Coal & Railway Co.

Mr. Chas. Putnam, of Dawson City, formerly of Nova Scotia, was a visitor to Montreal in January. Mr. Putnam is interested in the Gold Hill properties which were organized into a corporation by the Palmer Bros.

Lieut.-General Sir Henry C. Wilkinson arrived in Montreal on February 11th, and will remain in that city for a week or ten days. General Wilkinson is perfecting his arrangements for the re-opening of the Regina mine, and will commence sinking as soon as the mine has been unwatered.

J. B. Tyrrell, M.E., of Dawson, and formerly of the Geological Survey, is spending a few weeks in Ottawa with his family. When Mr. Tyrrell went into the Yukon some seven years ago, his wife and children did not accompany him, hence his home coming has been a joyous event for himself and family.

Lord Strathcona has been elected an honorary member of the Institute of Civil Engineers of London. This is an honor which is only accorded very distinguished citizens of the world, and the eminent High Commissioner for Canada is accorded the honor because of his services in that position and as Chancellor of McGill University.

Mr. G. S. C. Lindsay, managing director of the Crow's Nest Pass Coal Co., and Mr. J. McEvoy, geologist of the same company, have been in Victoria, B.C., where Mr. Lindsay testified before the Assessment Commmission to the injustice of the tax in its present incidence. The provincial tax of five per cent. he stated to be excessive; the coal company is already paying a triple tax, and he suggested that coal lands should be placed in a class by themselves, and taxed less heavily than at present.

Dr. Wm. G. Mitchell, a native of Quebec, died in January at the Jubilee Hospital in Victoria, at the age of forty. Dr. Mitchell was born in the city of Quebec, and received his education and degree from Edinburgh University. As a football athlete his reputation was unexcelled. He came out as physician on the C. P. R. boats at the time of the Klondike excitement, and was the first Canadian to make locations in Atlin Camp. It is due to his energy that the British-American Company was formed to hydraulic and dredge ground in Atlin district.

Dr. John B. Porter, Professor of Mining and Metallurgy at McGill University, has received an invitation from the British Association for the Advancement of Science to deliver an address before the meeting of the Association which is to be held at Johannesburg, South Africa, in August next. If the university work will permit, Dr. Porter will accept the invitation, which is not only a due and pleasing compliment to Dr. Porter, but is also a tribute to McGill's increasing reputation in the world of science.

At the annual general meeting of shareholders of the British Columbia Record, Limited, held at Victoria, British Columbia, on February 1, inst., Mr. E. Jacobs was appointed managing director of the company in succession to Mr. H. Mortimer Lamb, who, for health reasons, voluntarily retired from the management of the British Columbia Mining Record with which he has been actively associated for about seven years. By arrangement with Mr. Lamb, Mr. Jacobs had already relieved him of the duties of editor of that journal.

Mr. Robert H. Stewart has been appointed to be superintendent of the Centre Star and War Eagle mines at Rossland. Mr. Stewart is a graduate of McGill, in the class of '96, and was gold medallist for that year.

Mr. E. T. Corkill has been appointed an Inspector of Mines for Ontario, vice Mr. W. E. H. Carter, resigned. Mr. Corkill is a graduate of Kingston's university, and has had some practical experience since graduation. His qualifications are good.

BOOK NOTICES.

Bulletin No. 2 of the Geological Survey of Ohio, on the Uses of Hydraulic Cement, is a valuable monograph on an article which is now greatly interesting all classes of constructors, mining and otherwise. The book has been written for the mass of the people, and is guiltless of chemical or engineering formulae, but is none the less sound, reliable and authoritative. Prof. F. H. Eno, by whose pen the book is written, has personally studied his subject, and travelled widely to visit in person the examples he describes and illustrates. The Bulletin serves the admirable purpose of enclosing within its covers the substance of what hitherto has been scattered through a vast mass of miscellaneous literature. As a careful and critical presentation of the modern uses to which cement may be put it stands alone at present.

The Bulletin briefly summarizes the history of cement, and then gives concise information upon its general uses. The subject of mortars, stucco and mouldings, of its use in concrete for foundations, fortifications, houses, sea walls and railway work; of its uses in reinforcing or casing metal work, and its adaptabilities to all architectural purposes is treated in a manner well calculated to inform the educated as well as the uneducated.

The Review has noted before the commendable methods used by Prof. Edward Orton, Jr., the State Geologist of Ohio, in the conduct of the Ohio State Survey; the preface to this small volume relates some of them, and they are models for our own Government to follow.

The Geological Survey of Canada has begun the publication of an excellent system of bulletins on the Economic Minerals of Canada. These are issued in pamphlet form, and have been made up from existing information scattered through some six hundred publications of the Survey, extending over a period of sixty years. The information contained in these older reports has been in some cases correlated and rewritten to the year 1902, in other cases taken verbatim from older volumes and not brought within five or six years of date of publication. It is about the only matter for criticism that data for all the issues are not brought up to January 1st, 1904. The list is as follows:—

818.	Platinum	by E. D. Ingall.
851.	Coal	by E. D. Ingall.
854.	Asbestos	by Dr. R. W. Ells.
857.	Infusional Earth	by E. D. Ingall
858.	Manganese	by E. D. Ingall.
859.	Salt	by E. D. Ingall.
860.	Zinc	by E. D. Ingall.
869.	Mica	by Dr. R. W. Ells.
872.	Molybdenum and Tungsten	by R. A. A. Johnston.
873.	Nickel and Copper of the Sudbury Mining District	by Dr. A. E. Barlow.
877.	Graphite	by Dr. R. W. Ells.
880.	Peat	by Dr. R. Chalmers.
881.	Apatite	by Dr. R. W. Ells.
882.	Copper in Nova Scotia, New Brunswick and Quebec	by Dr. R. W. Ells.

There has also been issued a small pamphlet on Marl Deposits in Ontario, Quebec. New Brunswick and Nova Scotia.

The pamphlets are unequal in value, owing doubtless to the different ideas of the various compilers, for it is evident that no formulated rules have been laid down as to the scope and character of the information to be contained. some of them contain the definite figures and ideas which investors and investigators desire, and others are purely geological in expression and deficient in commercial data. This is noticeable in the bulletins on Mica and Graphite more particularly. The deficiency of not bringing the subject matter up to date is noticeable in both the Asbestos and Zinc bulletins, and the latter is particularly regrettable in view of the great importance which the latter metal has assumed during the last two years in the Province of British Columbia.

The bulletins on Coal and Peat are specially to be commended; Dr. Chalmers has treated his subject thoroughly, and there is little about Peat in Canada which is not included in his bulletin.

The admirable monograph by Dr. A. E. Barlow on the Nickel and Copper Deposits of the Sudbury District deserves and will have special mention in our next issue.

Dr. Robert Bell, the Acting Director of the Survey, has done good service in having the scattered facts and reports brought together, condensed and issued in their present form. If recast from year to year and new information be included, the Survey will have earned for itself the gratitude of every individual interested in the mineral development of Canada.

INDUSTRIAL NOTES.

The Ottumwa Box Car Loader Co., of Ottumwa, Iowa, is doing a good Canadian business, their loaders having rapidly gotten into favor with Canadian shippers. The last shipments have been made to the International Coal & Coke Co., of Alberta, and to the Souris Coal Mining Co., of Manitoba.

The Westinghouse Electric & Manufacturing Company has closed a contract with the United Railways and Electric Company, of Baltimore, Maryland, for an alternating current generator to be rated at 5,000 kilowatts. It will be of the flywheel type, with 32 poles, and will run at 94 revolutions per minute. The generator will be wound for 13,000 volts, three-phase, with a frequency of 25 cycles.

The 5,000 kilowatt generator now on order is to run in parallel with the five 2,000 killowatt generators which the Westinghouse Company has already installed in the Pratt Street Station in Baltimore.

The same company has sold to the La Belle Iron Works, at Steubenville, Ohio, a direct current engine-type generator, to be rated at 1,000 kilowatts, the voltage to be 250.

The Hamilton Cataract Power, Light & Traction Company recently started the two 5,000-kilowatt Westinghouse generators in their De Cew Fall power station in Ontario. Power is supplied from feeders to the Welland Canal, which, at the station give a head of 267 feet. The generators are of the two-bearing type, direct connected to Escher-Wyss water-wheels, and run at a speed of 286 revolutions per minute. They generate a 3-phase current at a frequency of 66 cycles, and an intensity of 2,400 volts. The power is transmitted to the city of Hamilton, Ontario, where it is used for lighting, street railway and manufacturing purposes. A reserve steam-driven station is located at Hamilton, which contains two 1,000 k.w. Westinghouse generators. The entire station and high tension apparatus are of Westinghouse design. The high tension apparatus is designed for a pressure of 40,000 volts, but will be operated for a time at 20,000 volts.

The Allis-Chalmers-Bullock Company have been celebrating in both Milwaukee and Montreal. At the former place some sixty-six of the officers, heads of departments and salesmen dined and were photographed. At Montreal, on the 17th of January, the directors gave a banquet at the Canada Club, at which over fifty representatives were present. The president, Mr. Geo. Bullock, of Cincinnati, spoke optimistically of his personal observations in British Columbia. Mr. B. H. Warren, president of the parent company, (Allis-Chalmers), spoke of the importance of the position which the salesmen held, and gave some sound advice from his own large experience. Other officials present contributed speeches.

Then the members of the Canadian Society of Civil Engineers, to the number of 150, visited the works on Jan. 25. They expressed surprise at the progress of the company, and at the amount and character of electrical work under construction. They were given an interesting demonstration on the construction and operation of drills, coal cutters and compressors. On leaving, each member was presented with a handsome leather card-case as a souvenir of the visit. Now the same corporation has extended to the members of the Canadian Mining Institute a most courteous invitation to visit and inspect their factories and to lunch on Friday, the 30th of March.

MINING NOTES.

NEWFOUNDLAND.

The Tilt Cove Copper Company, Limited, declared a dividend on January 17th of one shilling per share, free of income tax.

The output of iron ore from Wabana, Bell Island, 1904, was the second largest since mining began. The plans for 1905 promise the biggest output yet achieved.

The copper mines at Baie Verte, Tilt Cove, and northern ports, report an exceptionally good year and a large output of ore. The Colony's yield of copper ore promises to be much increased by the results of the York Harbor mine's shipments. This mine is on the West Shore, and is the only shipping mine on that shore.

NEW BRUNSWICK.

The New Brunswick Iron Company, Limited, have about a dozen men at work at Lepreaux locating seams of ore and boring to test the thickness and dip of the same. No sinking of shafts will be attempted until spring. The company has been incorporated with a capital of $1,000,000. The ore is magnetite.

NOVA SCOTIA.

The workings of Dominion No. 1 Colliery are to be extended under the sea.

The Dominion Colliery of the Intercolonial Coal Co. is averaging a daily output of 950 to 1,000 tons.

Wages paid to coal men in Nova Scotia during the year 1904 amounted to $6,680,000.

The Brookfield Gold Mining Co. is averaging an output of about 900 tons of ore monthly, yielding about $8 per ton.

The year's output for 1904 of the Dominion Iron & Steel Company is reported at 143,113 tons of steel in various shapes and forms.

John Scott, of Millvale, N.S., was crushed to death at Springhill in January by being caught between two cars which he was coupling up.

The Dominion Iron & Steel Co. in 1904 used 170,000 tons of coke (388,500 tons of coal), 290,000 tons of iron ore and 17,000 tons of limestone (dolomite).

The output of No. 2 blast furnace of the Dominion Iron & Steel Co. for January was 9,000 tons. The product of the rod mill for one week in the same month amounted to 264 tons.

The length of the slope at the Drummond Colliery of the Intercolonial Coal Co. is said to be the longest on the North American continent; it is now slightly over 6,700 feet.

A consolidation of the properties of the Maritime Coal Co., the Minudie Coal Co., and the old Joggins is rumored from Chignecto. Montreal capital is said to be behind the scheme.

The daily earnings of coal cutters at the Springhill Collieries averaged $2.98 for the year 1904, the highest wages earned since 1885, and the highest of any colliery in Nova Scotia.

The Boston Tangier Mining Co. is the name of the new concern which has taken over the property of the Tangier Amalgamated Co. The superintendent of the new company is Mr. E. N. Higley, of Boston.

The Sterling gold property at Oldham, which has been bought, and is now controlled by Mr. John B. Forster and associates, is turning out some rich ore. The last clean-up gave a return of 4 7-10 ozs. per ton.

The Inverness Railway and Coal Co. report that the quality of the coal is much improved to the deep; a second picking table and another tipple are to be constructed to give facilities for larger shipments in 1905.

The North Sydney Herald is authority for the statement that the Nova Scotia Steel & Coal Company will erect a second blast furnace in the spring. The construction of the open hearth furnaces is proceeding rapidly.

The company which is working the Debert seam of coal, the Colchester Coal and Railway Company, reports that the quality and size of the seam continues with work to the deep. The railway will be connected with I. C. R. rails by early summer, when shipping will commence.

The oft-asked question as to when a dividend on Dominion Iron & Steel may be expected has been answered by President Plummer to the following effect, that earnings and market must be increased and expanded before an answer can take definite shape.

The financial position of the Nova Scotia Steel & Coal Co. appears to be in as sound condition as ever before. The company has had a good year, its output of coal reaching the half million mark; its new furnace at Sydney is earning well, and the mills at Trenton are filled with orders.

The estimated values of the mineral products of Nova Scotia (as given in the Industrial Advocate) were as follows:—

Coal	$13,000,000
Pig Iron	3,100,000
Steel	2,730,000
Gold	500,000
Other Minerals (Gypsum, Manganese, Copper, etc.)	605,800

The record of the Dominion Iron & Steel Company for 1904 is represented by the following items:—

Total production of pig (basic and foundry), tons	76,601
Steel Ingots, tons	62,842
Blooms, Shafts, etc., tons	54,673
Billets and Wire Rods, tons	31,598
Tar, galls.	1,650,153
Sulphate of Ammonia, galls.	3,546,557
Sulphuric Acid, galls.	2,631
Output of Ore (Wabana), tons	625,000
Used at Sydney	220,000
Imports of Ore, tons	70,000
Coal consumed (including coal for coke), tons	385,000
Limestone quarried, tons	160,000

The collapse, or shut-down, of the Dolliver Mountain Mining and Milling Company is regarded as a great surprise. Boston capitalists have expended some $250,000 on this property in development and plant, and the equipment is regarded as the best in Nova Scotia. The owners are reticent as to the cause of the shut-down, but rumor says returns were less than $1.00 per ton of ore.

ONTARIO.

The Bully Boy mine in Camp Bay has been purchased by a corporation known as the Arizona Camp Bay Gold Mining Co.

It is reported that the Laurentian property (371) is turning out some good ore containing much visible gold. It is expected the diamond drill will arrive shortly to assist in the work of exploring the depths of this rich property.

The Bureau of Mines has received a report that a five-stamp mill has gone into successful operation at the Star of the East gold mine, in Kaladar township, Addington county. The first clean-up after fourteen hours' run gave $300 worth of gold. The shaft is down 150 feet, and the vein is strong and promising.

Steele's property, in the Sturgeon Lake district, is reported as producing richer ore than ever. Since the ten-stamp mill has been in commission several gold bricks have been shipped east from Ignace.

Development work at the mine owned by D. Garrison of Sturgeon Falls, near Warren, reveals better showings at each level. The mineral assays very high in copper, gold and silver.

The estate of Cornelius Shields, former manager of the Sault Ste. Marie companies, totalled $115,413, including $68,864 cash in banks. The estate is divided among the widow and five children.

Two furnaces are at present working full time at the smelter of the Canadian Copper Company, at Copper Cliff, and the output has considerably increased. Three new converters for the Bessemer plant have arrived, and will be immediatly installed at the smelter. President Wood, of the International Nickel Company, recently paid a visit of inspection to the works.

Mr. C. E. Hilary, of Rat Portage, has received instruction from Sir Henry Wilkinson to prepare the Black Eagle mine for operation again after a three years' disuse. During this time the large thirty-stamp mill has been kept in working order, and the rest of the machinery being in shape, it is expected that the mine will be in operation towards the end of March, after the arrival of Sir Henry, who left London about the first of the month.

Hon. J. P. Whitney, on assuming office as Premier, announced in an interview that "there will be a Department of Mines created in due course, which will have a Minister."

The Sudbury Journal puts forward the name of Mr. Frank Cochrane, of that town, for the position of Minister of the new Mines Department which Premier Whitney has announced his intention of creating.

Mr. T. J. Drummond, of the Lake Superior Corporation, in an interview recently, stated that the showing made by the various plants is entirely satisfactory to the executive. A decision had been reached to place both the veneer mill and the saw mill in operation, and there is sufficient raw material to keep the mills in continual operation.

The efforts of the management of the Giant mine, at Manitou, in the direction of exploring their property on H. W. 74, are progressing favorably, the shaft having now reached a depth of 100 feet, the results obtained under Supt. Polson being, it is said, very satisfactory.

Advices from Webbwood say that the Shakespeare Gold Mining Company has its stamp mill about completed, and in a short time expects to be turning out gold bricks.

One of the last announcements made by the late Ross Ministry before resigning office was to the effect that every dollar of the advance made by the Government to the Sault Ste. Marie Companies in the fall of 1903 had been repaid, and that the Ontario Government has been entirely relieved of its guarantee.

Captain J. H. Triggs, who organized and operated the Triggs Mining Company in the Rat Portage district from 1897 to 1900, and who has been residing in Duluth for the past few years, died at his home there on the 31st ult.

The Toronto Globe says that Messrs. Mackenzie & Mann have contracted for the erection of a pig iron furnace at Port Arthur. The smelter will have a capacity of from 150 to 200 tons of iron ore per day, and must be completed by October 1st next. The purpose is the development of the iron ore properties owned by them in the neighborhood of the Atikokan and Mattawan ranges, which lie along the Canadian Northern Railway. The enterprise will probably mean the employment of about 1,000 men.

The shaft of the Paymaster mine is now past the 130 feet mark, and very encouraging values have been obtained at that depth under the charge of J. Joy, who has recently succeeded John McLeod, who left after completing his contract.

H. J. Tharle, of the Redding Mining Co., has returned to Fort William from the east, where he conducted negotiations for machinery for a stamp mill to be erected at the company's mine in the Atikokan district. Construction will begin almost immediately, and Mr. Dolphin, of Montreal, will have charge of the installation of the machinery. It is thought that the new mill will be in working order before next fall.

BRITISH COLUMBIA.

The Slocan Star shipped 253 tons of silver-lead ore in January.

The Rambler - Cariboo mine has increased its share capital by $500,000.

During 1904 the Ottawa mine (Slocan) shipped 13,000 tons of ore.

During January the Whitewater lessees shipped out 22 tons of galena.

The daily output of the coal mine at Frank, Alberta, is now 650 tons.

The Idaho mine sent twenty tons of lead ore to the Trail smelter in January.

The Queen mine, at Salmo, reports a new find of galena ore worth $50 a ton.

In January the Ivanhoe mine shipped ninety-seven tons of galena and 137 tons of zinc ore.

The dry ore mine, the Home Run, has recently shipped twenty tons of dry ore to the smelter.

The Kamloops Coal and Development Co. are entertaining a proposition to sell the entire property.

No. 4 shaft of the Surprise mine in the Lardeau is taking out high grade ore.

The Hunter V. mine, producing flux, is shipping about seventy-five tons a day to the Trail smelter.

The Ymir and Queen mines are shipping concentrates to the Hall smelter.

The meeting of the Associated Boards of Trade has been fixed for February 22nd, at Nelson.

The Payne mine, under its lessees, made a shipment of ninety tons of ore in the first month of the year.

The lessees of the Antoine mine have shipped one carload this year and have another nearly ready.

The Bismarck mine has shipped twenty tons of lead ore this year and is now rawhiding forty tons more.

The agitation over the question of mine taxation is present in every camp in British Columbia.

The Brooklyn, Rawhide and Athelstan mines are shipping regularly to Montreal and Boston smelter.

The streak of high grade ore recently found in the Triune mine has proved to be continuous thus far.

The option on the Van Anda mine, given to the Chamberlain-Syndicate, of England, has been abandoned.

It is rumored that the free-gold property of the Cariboo-Camp McKinney Company will be re-opened in March.

The Lucky Jim mine shipped sixty-three tons of ore in January, and during that month also disbursed a dividend amounting to $8,000.

The Slocan Star mine is now shipping an average of 300 tons a month to the smelter at Trail. Forty men have steady work.

The 2,500 tons of zinc ore sold last month by the Slocan Star Co. will go to the United States Zinc Company at Pueblo, Colorado.

The Last Chance mine in the Slocan sent forty tons of galena to Trail and twenty tons of zinc ore to Pueblo in the month of January.

The Providence mine continues its record as a good property. On the first of the month the 400 foot level cut into a strong and rich ore body.

The St. Eugene mine reports its new pumping plant in successful operation, and the monthly output of ore to be now averaging 2,500 tons.

During January the Reco mine used 100 head of horses to rawhide ore from the mine to the railway. The amount shipped averaged fifteen tons a day.

The West Canadian Collieries at Frank, Alberta, has made a large contract with the C. P. R., to satisfy which will require the present output to be doubled. The collieries, therefore, may be expected to produce 6,500 tons daily during the next few months.

The Tacoma Steel Company, owning the Marble Bay mine, are prosecuting work vigorously, having struck good ore at a depth of 570 feet.

A premature explosion of a blast on the Senator Group, North Fork of Kettle River, on the 31st of January, killed one man and seriously injured two others.

The Nettie L. mine, owned by the Silver Cup Mines, Limited, opened up in a band of high grade ore, some five feet in thickness, the last week in January.

Several carloads of zinc ore have been sent to Iola, Kansas, from the American Boy. The mine also shipped forty tons of silver-lead ore during January.

Revised figures for the ore tonnage of the Granby Co., at Phoenix, B.C., give a total of 549,703 tons, as against 393,718 tons for 1903, an increase of forty per cent.

The old trick of selling "fake" locations has again been successfully practised in Spokane and vicinity; this time the bait was East Kootenay Coal and Oil Lands.

The Iron Mask mine, Kamloops, is to enlarge its present concentrator at a cost of about $7,500. This mine has a considerable amount of English capital interested in it.

The shares of the Morrison mine have been deposited in trust with the Spokane and Eastern Trust Co., to be exchanged on the basis of one share of Consolidated Montreal and Boston for thirty of Morrison.

American capital from the State of Washington has become interested in the Strathmore mine, near Greenwood. A sample taken across the vein by the new investors is said to have shown a value of $147 per ton.

The bricks made from the fireclay deposit at Matsqui, which were sent to the Trail smelter for trial have turned out well; they stood the heat and the action of the fluxes as well as the imported brick.

The work at the Chapleau mine, Slocan Lake country, which began about October 1st, has been unproductive, and the mine has been closed down. There is no pay ore in sight, and three months' work has failed to find any new bodies.

The Mother Lode property of the British Columbia Copper Company has uncovered a new deposit of ore of better grade than the ordinary ore of the mine. The deposit is 130 feet wide, and carries good values in both gold and copper.

Mr. C. Cameron, lessee of the Yankee Girl claim, reports the finding of two feet of good ore seventy feet from the supposed line of the pay streak.

The town of Ymir has been experiencing an unusual spell of cold weather; for ten days the thermometer did not register above zero.

From the detailed returns of December, 1904, lead ore shipments, it appears that the St. Eugene mine produced more lead than all of the West Kootenay mines put together. Its product was 995.2 tons of ore, carrying sixty-three per cent. of lead.

The Surprise, on Surprise Creek, in the Lardeau, has been opened with the view of selling to Nova Scotia parties, represented by R. P. Fraser, druggist, of Pictou. Large stories are in order, and some of them are being circulated by the press.

Owners of the stock of the Great Northern Mines, Limited, are again busy in the press of British Columbia with boom paragraphs respecting the Lardeau district. Results have been fairly satisfactory during 1904, but another year's work is necessary before any boom is justified.

The bonding of the Queen and Kootenay Bell mines, at Salmo, in the Ymir country, by Mr. Patsey Clark of Spokane, in the month of January, has given the camp quite an impetus. The leasing system, on which we had a recent editorial, is responsible for this option.

The commission which was appointed to investigate certain charges against Coal Mine Inspector Dick regarding the manner in which his department was being conducted, has exonerated him on every count. He has been reinstated in office, having ben suspended temporarily while the hearing was pending.

Rossland reports that work is to be resumed on the Crown Point mine, owned by the War Eagle Company. This property was extensively prospected and explored by J. B. Hastings when he was the manager of the War Eagle, but his work did not reveal any values in the vein, nor was he successful in locating the vein beyond the fault which cut it off.

The Associated Boards of Trade of British Columbia are discussing the necessity of a Dominion Department of Mines, with a Minister from British Columbia at the head of that Department. It is proposed to send a delegation to the capital to urge the creation of this new portfolio upon the Government.

The Pioneer Mining Company, owning the Two Friends, Black Prince and other locations on Lemon Creek, Slocan Lake Division, is now shipping monthly to the Canadian Smelting Works at Trail. The ore is "dry," but maintains a high average in silver with a small amount in gold.

The chief town of the Crow's Nest Pass region is Fernie, B.C., which now has a population of 3,000 people. There are 1,128 coke ovens here, which produce over 1,000 tons of coke per day. Fernie is the distributing point for Coal Creek, Michel and Carbonade, which latter is the new name for the old town of Morrisey.

The coal strike at Coleman at the mines of the Intercolonial Company was occasioned by the demands of the union for a very much higher scale of wages than obtains at Fernie. The union asked $4 for fire-boss, 65c and $4.00 for ton and yard, and $4.00 for timbering, as against $3.75, 55c and $1.00 respectively paid by the Crow's Nest Pass Coal Co.

The town of Silverton, B.C., had an excitement in January, due to the fact that a rifle bullet was fired through the window of the Victoria Hotel bar, and came very near hitting Mr. M. S. Davys, of Nelson, Mr. Davys is the lessee of the Emily Edith, Comstock and Hewitt mines, near Silverton, and the local press incline to the belief that the trouble arose from Mr. Davys supplying the cookhouses with Chinese cooks instead of with white ones.

The U. S. Zinc Company, operating at Pueblo, Col., has had its general agent, Mr. Edwin Anderson, in British Columbia during January making investigation of the probable reliable output of zinc ores from that province. Mr. Anderson, when interviewed, said that he thought the quality and quantity of the ores were satisfactory as to zinc contents, but his company wished to get ores with higher values in silver. The ideal ore, he stated, would be thirty-five per cent. of zinc with high silver values. His company would not pay for lead contents, as freight and duties would eat up all values in lead.

At the annual meeting of the Rossland-Kootenay Mining Co., Ltd., held at Salisbury House, London, E.C., the chairman, Mr. C. W. Milne, stated that all work would be confined to the Kootenay mine; that previous work had failed to locate higher values in the ore bodies, and that diamond-drilling had not yet been successful in finding ore of value. He also said that Mr. Thompson, their manager, had endeavored to find a suitable concentration process, but without success, and therefore the only thing to do has been to shut down the mine and conserve their remaining funds.

The Granby Consolidated Mining, Smelting and Power Co. has bought the Monarch, Tamarack and the Tamarack Fraction claims at Phoenix, B.C., for $130,000, and the Missing Link Fraction for $30,000, These claims carry low-grade gold-copper ore, similar in character to the Knob Hill and Old Ironsides.

In the settlement of the bankruptcy suits brought against Munroe & Munroe, New York, agents for the Cons. Montreal and Boston Co., the brokers who became creditors of the firm on the day of the failure have had set apart as their security shares of the company taken at the rate of $1.00 per share.

A syndicate will advance the $90,000 cash needed to discharge the urgent payments in the Mann and McKenzie properties, and shares sufficient to provide for payments not yet due on these properties have been set aside as a fund to meet the payments.

Munroe & Munroe will no longer represent the corporation, and are left to settle with their other creditors as best they may with any assets they may have other than Montreal and Boston shares.

YUKON.

The force of ten mining inspectors in the Yukon is to be reduced to two, and the recorders to four.

Dawson is excited by the projected visit if the American Institute of Mining Engineers in July next.

The estimate of the gold output from the Yukon Territory for 1904, as made by ex-Governor F. T. Congdon, is $10,000,000.

Major Z. T. Wood is Acting Commissioner for the Yukon Territory pending the appointment of a successor to F. D. Congdon, resigned.

Reports from the Tanana field confirm previous items in this column as to high prices and scarcity of food. Gold dust is but little in evidence this winter, but belief in its abundance next summer is universal.

The Gold Commissioner has been busy in the matter of adjudicating water rights. In the case of the Bonanza Creek Concession Co. vs. Cameron & Tyrrell, the Commissioner has ruled in favor of the plaintiff company.

Mr. J. W. Astley, a well-known D. L. S., reports that Lower Dominion Creek is busier than it has ever before been. The pay dirt is not of high grade but is uniform and of large extent. From the mouth of Gold Run for two miles down Dominion there is a very busy scene.

Dublin Gulch, on Haggart Creek, a tributary of the McQuesten River flowing into the Stewart, has been deemed not placer ground, and an hydraulic concession has been given to James Haddock. Several Dawson men are behind Haddock, and believe that both water and gold are present in good pay quantities.

Dawson papers in January reported the discovery on Skookum Hill, opposite the town of Bonanza, of a paying quartz deposit. The deposit was found in driving a length of fifty-six feet from the bottom of the shaft 150 feet deep. No values per ton are reported, neither are any data as to width of the deposit.

The somewhat notorious "Boyle Concession," on the Klondyke River and Hunker Creek has been sold to the Detroit-Yukon Mining Company, and the first payment of $250,000 is reported to have been made. The Detroit-Yukon Mining Co. already owns the Williams Concession in Hunker. The concession on Quartz Creek, held by Boyle Bros., is not in the transfer.

An amendment to the regulations permitting the diverting of water for mining purposes has been made in the shape of imposing fees, as follows:—For 60 inches or less, a fee of $10.00; for 60 to 200 inches, a fee of $25.00. The regulations provided for quantities of 200 inches or over. This amendment provides for quantities of less than 200 inches.

The New York Co which has possession of all the ground from Discovery to 84 below on Bullion Creek, Alsek District, is sending in large quantities of supplies; oats, lumber and provisions have been sent from Vancouver, as well as a saw mill and about 100 tons of machinery. Mr. Breeze, the manager, will own his own teams and do his own freighting from Whitehorse to Bullion Creek.

Enthusiasts from Portland are having a dredge built by the Hammond Mfg. Co. to dredge the bottom of Behring Sea, some thirty-five miles west of Cape Nome. The region there is shallow, and one J. H. Allheidt is reported to have obtained $48.00 from two wheelbarrow loads of sand and gravel scooped up in twenty-five feet of water.

A lady, Miss Kate Ryan by name, enjoys the distinction of being the only female official of the Dominion Government in the Yukon. Miss Ryan is employed as an inspector of gold dust in the baggage or on the person of the female traveller between Whitehorse and the boundary. She is at present absent from service visiting her relatives in New Brunswick.

The Governor-in-Council has amended par. 30 of the Regulations to read as follows:—

"Every entry made in the Mining Recorder's books shall show the date upon which such entry is made. No fees shall be charged for obtaining information from the Mining Recorder with respect to mining claims; documents filed shall be open to public inspection, but for copies of any documents a fee of $2.50 shall be charged up to two hundred words, and an additional fee of fifty cents for each extra hundred words."

COAL NOTES

The January output of the Dominion Coal Co.'s Collieries was 160,618 tons, with total shipments of 130,649 during the same period.

Japan mined 9,650,000 tons of coal in 1904; in 1894 the total product of that country did not exceed 3,000,000 tons.

The annual meeting of the Dominion Coal Company will be held at twelve o'clock on the 2nd of March, at the offices of the company.

The shipments from the Springhill Collieries of the Cumberland Railway and Coal Company for the month of January amounted to 24,676 tons.

The No. 2 Slope of the Springhill Collieries of the Cumberland Coal and Railway Co. is practically idle owing to lack of shipping facilities. The West Slope is working as usual.

The fleet of coal-carriers plying between the Dunsmuir mines, on Vancouver Island, and San Francisco, has been augmented by the steamship Tricolor, of 6,500 tons. The five vessels now engaged in this service have a monthly capacity of between 40,000 and 50,000 tons.

The Crow's Nest Pass Coal Company put out for the week ending January 7th the largest amount of coal yet recorded by that company, viz., 16,945 tons. Of this amount, Coal Creek produced 8,902 tons, Michel 6,438 tons, and Carbonado 1,605 tons.

Practically no coal has yet been banked by the Dominion Coal Co., as the company has shipped or used all that has been raised. The opening of new faces has been so well advanced that next summer the mines will be able to ship fresh mined coal as fast as it can be taken away.

The experiment made in December by the Dominion Coal Co. of sending a vessel loaded with coal to Montreal in the wake of the ice-breaker *Montcalm*, is not likely to be repeated. The struggles of the ice-breaker to keep the gorge just above Quebec free from ice are sufficient evidence for vessel owners.

The coal production of Colorado for 1904 decreased some fifteen per cent. from that of 1903. This was due to labor troubles in the spring of the year. The total production amounted to 6,776,551. Of this 4,738,389 tons were bituminous, 1,238,187 were lignitic, 744,571 semi-bituminous and 55,404 anthracite.

The Cumberland Railway & Coal Co. held its annual meeting recently, at which the old board of directors was re-elected. Sir George A. Drummond was re-elected president, and Mr. J. R. Cowans, general manager. The output of the company's collieries was 505,804 tons, the largest in the history of the company.

Governor Pennypacker of Pennsylvania has given utterance, in his annual message, to a doctrine which involves the vexed question of taxes on the product of an industry. His suggestion is that a tax, or royalty, be placed on every ton of coal mined, the proceeds to be devoted to the maintenance of roads and upkeep of the school funds. As Pennsylvania has an annual production of about 200,000,000 tons, if this thin edge of the wedge gets in the politician will have a joyful source of revenue to play with and handle.

The report of the Royal Commission on the Coal Supplies of the United Kingdom puts the quantity of coal remaining in the known coal fields of the kingdom at 100,000,000,000 tons, or a supply for 450 years at the present rate of consumption. The report states the belief of the Commission that the hitherto rapid rate of increase will not continue, but will become stationary and then decrease. The factors of increasing costs and foreign competition are not dealt with, but will be all powerful in their influence on the rate of production. The Commission notes the very great increase in production on the North American continent, and alludes to the probability of a large export coal trade from this side affecting the home production.

Digest of Recent Patents; Mining and Metallurgical.

Jan. 3rd, 1905.

12,301.—Process of Electrolytically Refining Lead. Anson G. Betts, Lansingbury, N.Y. A process which consists in subjecting to electrolysis an electrolyte containing a lead salt of a fluorin acid, and an agent capable of restraining the crystallization of the electro-deposited lead.

778,847.—Concentrator. Frederick M. Dillon and Wylie G. Wilson, Denver, Colo. A concentrating-table provided with riffles running the whole length of the table, the table having a motion to cause the concentrates to travel in the direction of the riffles and being open to permit the discharge of the concentrates at the rear extremities of the riffles, the said riffles being arranged in groups, the space between the groups of riffles being greater than the space between the riffles in any group.

779,365.—Gold Saving Apparatus. Edward S. Kelley, St. Joseph, Mich., assignor of one-half to Willis W. Cooper, Kenosha, Wis. In combination, a bucket having an outlet-opening in its side above its lower end, said bucket being adapted to contain a quantity of mercury; a funnel in said bucket having an elongated narrow discharge-opening facing away from said outlet-opening and arranged to be submerged in the mercury in said bucket; and an inclined amalgamated plate extending from said funnel to said outlet-opening, the lower edge of said plate being raised above the bottom of said bucket.

778,901.—Process of Reducing Lead Ores. Pedro G. Salom, Philadelphia, Pa. A process which consists in continuously spreading the ore in a finely-ground condition upon the surface of a suitable cathode, in the presence of a suitable electrolyte and a suitable anode; maintaining the ore upon the cathode until complete reduction has occurred; and then continuously removing the resultant mass of spongy lead from the cathode-plate at a rate corresponding to the rate at which the ore is spread.

779,091.—Process of Making Silicofluorid of Lead. Walter Mills, London, England, assignor to A. O. Granger, Cartersville, Ga. A process which consists in subjecting galena and cerusite to the action of hydrofluosilicic acid and blowing air through the mixture during the reaction.

779,310.—Process of Obtaining Metals from their Ores. Samuel Peacock, Chicago, Ill. A process which consists in treating ores containing iron and zinc and in roasting the same, reducing the iron to a metallic state at a temperature too low to reduce the zinc to a metallic state, separating the iron from the mass and then reducing the zinc to a metallic state.

779,037.—Method of Smelting Ore. James Gayley, New York, N.Y. A method which consists in subjecting the ore with carbonaceous fuel to a blast of dried air, the burden of fuel being less than the normal burden by an amount materially greater than that which would be required to dissipate the eliminated moisture.

Jan. 10, 1905.

779,844.—Electric Furnace. David R. S. Galsbraith, Auckland, New Zealand, assignor of one-half to William Steuart, Auckland, New Zealand. An electric furnace for treating iron-sand and other refractory ores and substances, comprising an encased furnace recessed to accommodate electric connections in circuit with a source of electric energy and having the sides of its fusing zone stepped internally with inclined chutes, a plurality of non-conducting intercepters mounted within the furnace at the stepped fusing zone and arranged in superposed relation and adapted together with such stepped parts of the furnace to deflect the material under treatment successively to the next lower intercepters, and with electric conductors leading into the fusing zone at the ends of each intercepter, and a plurality of V-shaped troughs perforated at their bottoms and serving to direct the material in thin streams longitudinally central of the under series of intercepters and conductors, whereby the shower charge of material will be caused at the time of each of its interceptions to complete and act as part of the electric circuit.

779,953.—Smelting Furnace. Alfred E. Manchester, Newburgh, N.Y. The combination with a furnace and a forehearth of a cut-off valve comprising two members, each member having an open portion and a closed portion and means for removably securing the open portion or the closed portion of each member to its respective furnace or forehearth.

779,566.—Roll Crushing Mill. Thomas L. Sturtevant, Quincy, and Thomas J. Sturtevant, Wellesley, Mass., assignors to the Sturtevant Mill Company, Portland, Me., a corporation of Maine. The combination with a pair of crushing-rolls and shafts by which said rolls are carried, of bearing supports or carriers, the rear portions of which are suitably recessed, bearing-boxes movably mounted in said supports or carriers, and nests of coil-springs housed in the rear recessed portions of said supports or carriers and yieldingly holding the said boxes in working position, said bearing supports or carriers being provided with tie-caps hooked over ribbed portions thereof.

780,002.—Amalgamating Apparatus. Julius, Jean and William C. Schmitt, Denver, Colorado. The combination of a bottom receptacle having outwardly flared walls, and amalgamated tray located in the receptacle and also having outwardly-flared walls, a bottomless casing projecting into the tray, and having its lower edges supported above the bottom of the tray, a feed-receptacle mounted on the casing, a rearwardly extending downwardly-curved conduit connected with the feed-receptacle, and depending open-ended tubes also connected with the feed receptacle, their lower extremities terminating in the forward part of the tray.

Jan. 17. 1905.

780,337.—Furnace for Burning Ore Briquets. Gustaf Grondal, Djursholm, Sweden. A furnace of the channel type for burning, by gas-heating, ore briquets carried on trucks, and consisting of a compartment for preliminary heating, a cooling compartment and a burning chamber of a somewhat greater height situated between these compartments, such furnace having channels in the walls and roof for passage of a part of the air for combustion, these channels being connected with each other and with one or more openings in the wall of the inlet of the gas to the burning-chamber, the compartments of the furnace for preliminary heating being of greater height than the cooling compartment.

780,191.—Electro-chemical Separation of Metals. Woolsey M. Johnson, Hartford, Conn. A process which includes immersing an electrode in an acid solution of ferrous ammonium chloride, subjecting it to electrolytic action and depositing upon another electrode, the electrolytic solution being from time to time subjected to a cementation process.

780,387.—Furnace for Roasting Ores, etc. William W. Tobey, Iola, Kansas. The combination of a furnace, travelling mechanism disposed adjacent thereto, rake-carrying bars connected with said travelling mechanism, and shields secured to and encircling the portions of said rake-bars that enter the furnace whereby the said bars are protected from excessive heat.

780,203.—Charging Device for Coke Ovens. James B. Ladd, Wayne, Pa. The combination of a longitudinally movable peel, a threaded shaft rotatably mounted diagonally across the longitudinal extension of the peel, and means connected with the peel for co-operating with the shaft to cause the movement of the peel upon the rotation of the shaft.

Jan. 24, 1905.

780,716.—Method of Agglomerating Magnetic Ore. Elmer Gates, Chevy Chase, Md., assignor to Theodore J. Mayer, Washington, D.C. A method which consists in establishing an electric arc between opposing surfaces, feeding opposing streams of sand over said surfaces, and causing said streams of sand to fall freely from said surfaces so as to break the arc originally formed and establishing arcing from one of the falling streams to the other, thereby fusing and agglomerating the sand into small lumps of a size varying substantially from that of a wheat-grain to that of a bean.

780,529.—Amalgamator. John B. Rossman, St. Paul, Minn. An amalgamator-bowl having a circular concaved bottom, rubbers pivotally mounted within said bowl, and means for imparting to the rubbers an oscillatory motion about its centre and over a segment of the bottom thereof, whereby successive areas of agitated and dead water are produced within the bowl when in operation.

780,870.—Magnetic Separator for Ores or Similar Materials. John T. Dawes, Liverpool, England. The combination of a moving conveyor for receiving material, a second moving conveyor above the first moving conveyor, a magnet-pole above the second moving conveyor, and a shield disposed under the second moving conveyor between the outer extremity of the magnet-pole and the first moving conveyor and parallel to and in contact with the side of the first moving conveyor, part of the top of the shield under the magnet-pole being level with the first moving conveyor.

Jan. 31, 1905.

781,133.—Process of Treating Zinc-Sulphide Ores containing Iron. Chauncey E. Dewey, Denver, Colo., assignor to the American Zinc and Chemical Company, Denver, Colo. A process consisting first in roasting the ore, whereby the zinc is converted into zinc sulphate and zinc oxide, and the iron present into ferric oxide as far as practicable; second, placing the ore thus prepared in water; and, third, maintaining the ore in suspension in the solution by the introduction of sulphurous gas, whereby the zinc oxide present is formed into zinc sulphite, and the latter into zinc sulphate by reaction with the ferric oxide.

781,450.—Automatic Dumping Ore-Elevator. Daniel R. McTaggart, Butte, Mont., assignor of one-half to John P. O'Neill, Butte, Mont. The combination of a frame, a car movable therein, said car having an opening in the side thereof, an apron pivoted to said car for closing said opening, projections mounted on the side of the apron, and a latching device pivoted to the car and designed to engage with the projections for locking the apron against movement.

781,077.—Electro-magnetic Ore Separator. Erich Langguth, Euskirchen, Germany. The combination with pole-pieces of an armature rotating between said pole-pieces, and having windings, a shield of magnetic material mounted directly on said armature and rotating therewith, means for feeding the material to be separated to said armature, and means for collecting the separated material.

781,175.—Dumping-Car. Charles Barett, Somerville, Mass. A dumping-car comprising in its construction a truck, a truck-plate fast to said truck, an intermediate plate swivelled to said truck-plate, trunnions fast to said intermediate plate upon opposite sides thereof, respectively, a dumping car-body, and brackets fast to the under side of said body, each of said brackets provided, respectively, with a vertical slot opening through the under side thereof and adapted to receive one of the said trunnions, whereby said body is removably attached to said intermediate plate.

781,520.—Method of Treating Ores. Hascal A. Hogel and Herbert A. Hogel, New York, N.Y., assignors to said Hascal A. Hogel and David Wallace, New York, N.Y. A method which consists in subjecting the ore to the action of a solution containing certain chemicals, and intensifying the solvent action of said solution upon said ore by atomizing the mixed mass.

PROVINCE OF NOVA SCOTIA.

Leases for Mines of Gold, Silver, Coal, Iron, Copper, Lead, Tin

—AND—

PRECIOUS STONES.

TITLES GIVEN DIRECT FROM THE CROWN, ROYALTIES AND RENTALS MODERATE.

GOLD AND SILVER.

Under the provisions of Chap. 1, Acts of 1892, of Mines and Minerals, Licenses are issued for prospecting Gold and Silver for a term of twelve months. Mines of Gold and Silver are laid off in areas of 150 by 250 feet, any number of which up to one hundred can be included in one License, provided that the length of the block does not exceed twice its width. The cost is 50 cents per area. Leases of any number of areas are granted for a term of 40 years at $2.00 per area. These leases are forfeitable if not worked, but advantage can be taken of a recent Act by which on payment of 50 cents annually for each area contained in the lease it becomes non-forfeitable if the labor be not performed.

Licenses are issued to owners of quartz crushing mills, who are required to pay Royalty on all the Gold they extract at the rate of two per cent. on smelted Gold valued at $19 an ounce, and on smelted Gold valued at $18 an ounce.

Applications for Licenses or Leases are receivable at the office of the Commissioner of Public Works and Mines each week day from 10 a.m. to 4 p.m., except Saturday, when the hours are from 10 to 1. Licenses are issued in the order of application according to priority. If a person discovers Gold in any part of the Province, he may stake out the boundaries of the areas he desires to obtain, and this gives him one week and twenty-four hours for every 15 miles from Halifax in which to make application at the Department for his ground.

MINES OTHER THAN GOLD AND SILVER.

Licences to search for eighteen months are issued, at a cost of thirty dollars, for minerals other than Gold and Silver, out of which areas can be selected for mining under lease. These leases are for four renewable terms of twenty years each. The cost for the first year is fifty dollars, and an annual rental of thirty dollars secures each lease from liability to forfeiture for non-working.

All rentals are refunded if afterwards the areas are worked and pay royalties. All titles, transfers, etc., of minerals are registered by the Mines Department for a nominal fee, and provision is made for lessees and licensees whereby they can acquire promptly, either by arrangement with the owner or by arbitration, all land required for their mining works.

The Government as a security for the payment of royalties, makes the royalties first lien on the plant and fixtures of the mine.

The unusually generous conditions under which the Government of Nova Scotia grants its minerals have introduced many outside capitalists, who have always stated that the Mining laws of the Province were the best they had had experience of.

The royalties on the remaining minerals are: Copper, four cents on every unit; Lead, two cents upon every unit; Iron, five cents on every ton; Tin and Precious Stones, five per cent.; Coal, 10 cents on every ton sold.

The Gold district of the Province extends along its entire Atlantic coast, and varies in width from 10 to 40 miles, and embraces an area of over three thousand miles, and is traversed by good roads and accessible at all points by water. Coal is known in the Counties of Cumberland, Colchester, Pictou and Antigonish, and at numerous points in the Island of Cape Breton. The ores of Iron, Copper, etc., are met at numerous points, and are being rapidly secured by miners and investors.

Copies of the Mining Law and any information can be had on application to

THE HON. A. DRYSDALE,

Commissioner Public Works and Mines,

HALIFAX, NOVA SCOTIA.

PROVINCE OF QUEBEC

The attention of Miners and Capitalists in the United States and in Europe is invited to the

GREAT MINERAL TERRITORY

Open for investment in the Province of Quebec.

Gold, Silver, Copper, Iron, Asbestos, Mica, Plumbago, Phosphate, Chromic Iron, Galena, Etc.

ORNAMENTAL AND STRUCTURAL MATERIALS IN ABUNDANT VARIETY.

The Mining Law gives absolute security to Title, and has been specially framed for the encouragement of Mining.

Mining concessions are divided into three classes :—

1. In unsurveyed territory (*a*) the first class contains 400 acres, (*b*) the second, 200 acres, and (*c*) the third, 100 acres.

2. In surveyed townships the three classes respectively comprise one, two and four lots.

All lands supposed to contain mines or ores belonging to the Crown may be acquired from the Commissioner of Colonization and Mines (*a*) as a mining concession by purchase, or (*b*) be occupied and worked under a mining license.

No sale of mining concessions containing more than 400 acres in superficies can be made by the Commissioner to the same person. The Governor-in-Council may, however, grant a larger extent of territory up to 1,000 acres under special circumstances.

The rates charged and to be paid in full at the time of the purchase are $5 and $10 per acre for mining lands containing the superior metals* ; the first named price being for lands situated more than 12 miles and the last named for lands situated less than 12 miles from the railway.

If containing the inferior metal, $2 and $4 according to distance from railway

Unless stipulated to the contrary in the letters patent in concessions for the mining of superior metals, the purchaser has the right to mine for all metals found therein ; in concessions for the mining of the inferior metals, those only may be mined for.

*The superior metals include the ores of gold, silver, lead, copper, nickel, graphite, asbestos, mica, and phosphate of lime. The words inferior metals include all other minerals, and ores.

Mining lands are sold on the express condition that the purchaser shall commence *bona fide* to mine within two years from the date of purchase, and shall not spend less than $500 if mining for the superior metals ; and not less than $200 if for inferior metals. In default, cancellation of sale of mining lands

(*b*) Licenses may be obtained from the Commissioner on the following terms :—Application for an exploration and prospecting license, if the mine is on private land, $2 for every 100 acres or fraction of 100 ; if the mine is on Crown lands (1) in surveyed territory, $5 for every 100 acres, and (2) in unsurveyed territory, $5 for each square mile, the license to be valid for three months and renewable. The holder of such license may afterwards purchase the mine, paying the prices mentioned.

Licenses for mining are of two kinds: Private lands licenses where the mining rights belong to the Crown, and public lands licenses. These licenses are granted on payment of a fee of $5 and an annual rental of $1 per acre. Each license is granted for 200 acres or less, but not for more ; is valid for one year, and is renewable on the same terms as those on which it was originally granted. The Governor-in-Council may at any time require the payment of the royalty in lieu of fees for a mining license and the annual rental—such royalties, unless otherwise determined by letters patent or other title from the Crown, being fixed at a rate not to exceed three per cent of the value at the mine of the mineral extracted after deducting the cost of mining it.

The fullest information will be cheerfully given on application to

THE MINISTER OF LANDS, MINES AND FISHERIES,
PARLIAMENT BUILDINGS, QUEBEC.

Ontario's Mining Lands..

THE Crown domain of the Province of Ontario contains an area of over 100,000,000 acres, a large part of which is comprised in geological formations known to carry valuable minerals and extending northward from the great lakes and westward from the Ottawa river to the Manitoba boundary.

Iron in large bodies of magnetite and hematite: copper in sulphide and native form; gold, mostly in free milling quartz; silver, native and sulphides; zincblende, galena, pyrites, mica, graphite, talc, marl, brick clay, building stones of all kinds and other useful minerals have been found in many places, and are being worked at the present time.

In the famous Sudbury region Ontario possesses one of the two sources of the world's supply of nickel, and the known deposits of this metal are very large. Recent discoveries of corundum in Eastern Ontario are believed to be the most extensive in existence.

The output of iron, copper and nickel in 1903 was much beyond that of any previous year, and large developments in these industries are now going on.

In the older parts of the Province salt, petroleum and natural gas are important products.

The mining laws of Ontario are liberal, and the prices of mineral lands low. Title by freehold or lease, on working conditions for seven years. There are no royalties.

The climate is unsurpassed, wood and water are plentiful, and in the summer season the prospector can go almost anywhere in a canoe.

The Canadian Pacific Railway runs through the entire mineral belt.

For reports of the Bureau of Mines, maps, mining laws, etc., apply to

HONORABLE E. J. DAVIS,
Commissioner of Crown Lands,

or

THOS. W. GIBSON,
Director Bureau of Mines,
Toronto, Ontario.

Dominion of Canada

SYNOPSIS OF REGULATIONS

For disposal of Minerals on Dominion Lands in Manitoba, the North-west Territories and the Yukon Territory.

COAL.

Coal lands may be purchased at $10 per acre for soft coal and $20 for anthracite. Not more than 320 acres can be acquired by one individual or company. Royalty at the rate of ten cents per ton of 2,000 pounds shall be collected on the gross output.

QUARTZ.

Persons of eighteen years and over and joint stock companies holding free miner's certificates may obtain entry for a mining location.

A free miner's certificate is granted for one or more years, not exceeding five, upon payment in advance of $7.50 per annum for an individual, and from $50 to $100 per annum for a company, according to capital.

A free miner, having discovered mineral in place, may locate a claim 1500 x 1500 feet by marking out the same with two legal posts, bearing location notices, one at each end on the line of the lode or vein.

The claim shall be recorded within 15 days if located within ten miles of a mining recorder's office, one additional day allowed for every additional ten miles or fraction. The fee for recording a claim is $5.

At least $100 must be expended on the claim each year or paid to the mining recorder in lieu thereof. When $500 has been expended or paid, the locator may, upon having a survey made, and upon complying with other requirements, purchase the land at $1.00 an acre.

Permission may be granted by the Minister of the Interior to locate claims containing iron and mica, also copper, in the Yukon Territory of an area not extending 160 acres.

The patent for a mining location shall provide for the payment of a Royalty ot 2½ per cent. of the sales of the products of the location.

PLACER MINING.

Manitoba and the N. W. T., excepting the Yukon Territory.—Placer mining claims generally are 100 feet square; entry fee $5, renewable yearly. On the North Saskatchewan River claims are either bar or bench, the former being 100 feet long and extending between high and low water mark. The latter includes bar diggings, but extends back to the base of the hill or bank, but not exceeding 1,000 feet. Where steam power is used, claims 200 feet wide may be obtained.

Dredging in the rivers of Manitoba and the N. W. T., excepting the Yukon Territory.—A free miner may obtain only two leases of five miles each for a term of twenty years, renewable in the discretion of the Minister of the Interior.

The lessee's right is confined to the submerged bed or bars of the river below low water mark, and subject to the rights of all persons who have, or who may receive entries for bar diggings or bench claims, except on the Saskatchewan River, where the lessee may dredge to high water mark on each alternate leasehold.

The lessee shall have a dredge in operation within one season from the date of the lease for each five miles, but where a person or company has obtained more than one lease one dredge for each fifteen miles or fraction is sufficient. Rental, $10 per annum for each mile of river leased. Royalty at the rate of two and a half per cent. collected on the output after it exceeds $10,000.

DREDGING IN THE YUKON TERRITORY.

Six leases of five miles each may be granted to a free miner for a term of twenty years, also renewable.

The lessee's right is confined to the submerged bed or bars in the river below low water mark, that boundary to be fixed by its position on the 1st day of August in the year of the date of the lease.

The lessee shall have one dredge in operation within two years from the date of the lease, and one dredge for each five miles within six years from such date. Rental, $100 per mile for first year and $10 per mile for each subsequent year. Royalty, same as placer mining.

PLACER MINING IN THE YUKON TERRITORY.

Creek, gulch, river and hill claims shall not exceed 250 feet in length, measured on the base line or general direction of the creek or gulch, the width being from 1,000 to 2,000 feet. All other placer claims shall be 250 feet square.

Claims are marked by two legal posts, one at each end, bearing notices. Entry must be made within ten days, if the claim is within ten miles of mining recorder's office. One extra day allowed for each additional ten miles or fraction.

The person or company staking a claim must hold a free miner's certificate.

The discoverer of a new mine is entitled to a claim of 1,000 feet in length, and if the party consists of two, 1,500 feet altogether, on the output of which no royalty shall be charged, the rest of the party ordinary claims only.

Entry fee, $10. Royalty at the rate of two and one-half per cent. on the value of the gold shipped from the Yukon Territory to be paid to the Comptroller.

No free miner shall receive a grant of more than one mining claim on each separate river, creek or gulch, but the same miner may hold any number of claims by purchase, and free miners may work their claims in partnership by filing notice and paying fee of $2. A claim may be abandoned, and another obtained on the same creek, gulch or river, by giving notice and paying a fee.

Work must be done on a claim each year to the value of at least $200. A certificate that work has been done must be obtained each year; if not, the claim shall be deemed to be abandoned, and open to occupation and entry by a free miner.

The boundaries of a claim may be defined absolutely by having a survey made and publishing notices in the Yukon Official Gazette.

PETROLEUM.

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Department of the Interior,

Ottawa, February, 1904.

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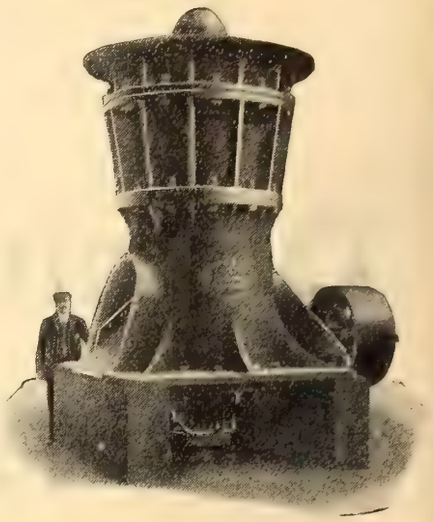

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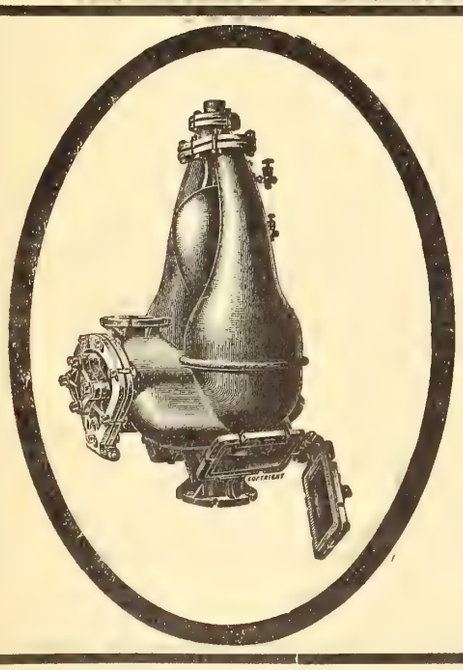

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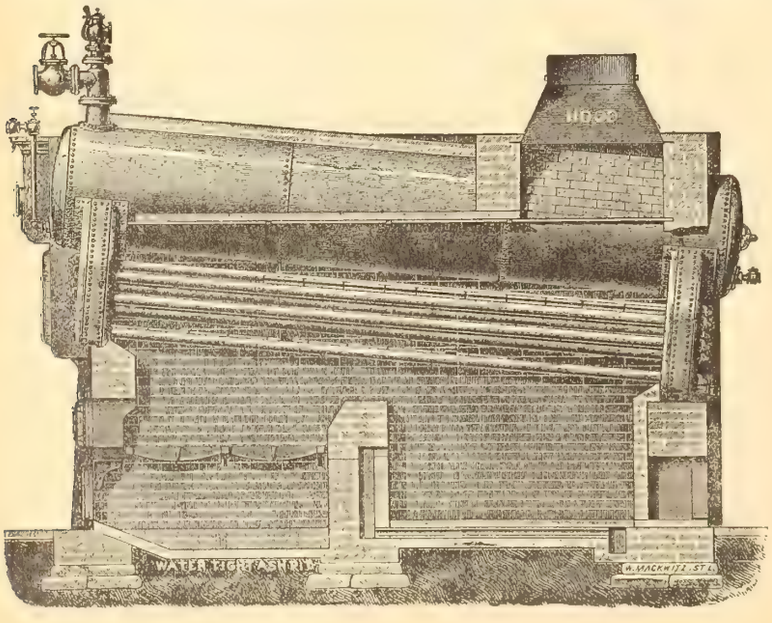

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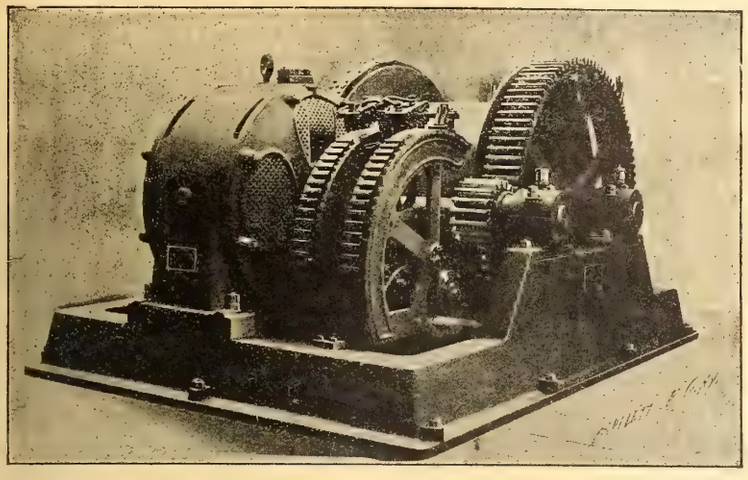

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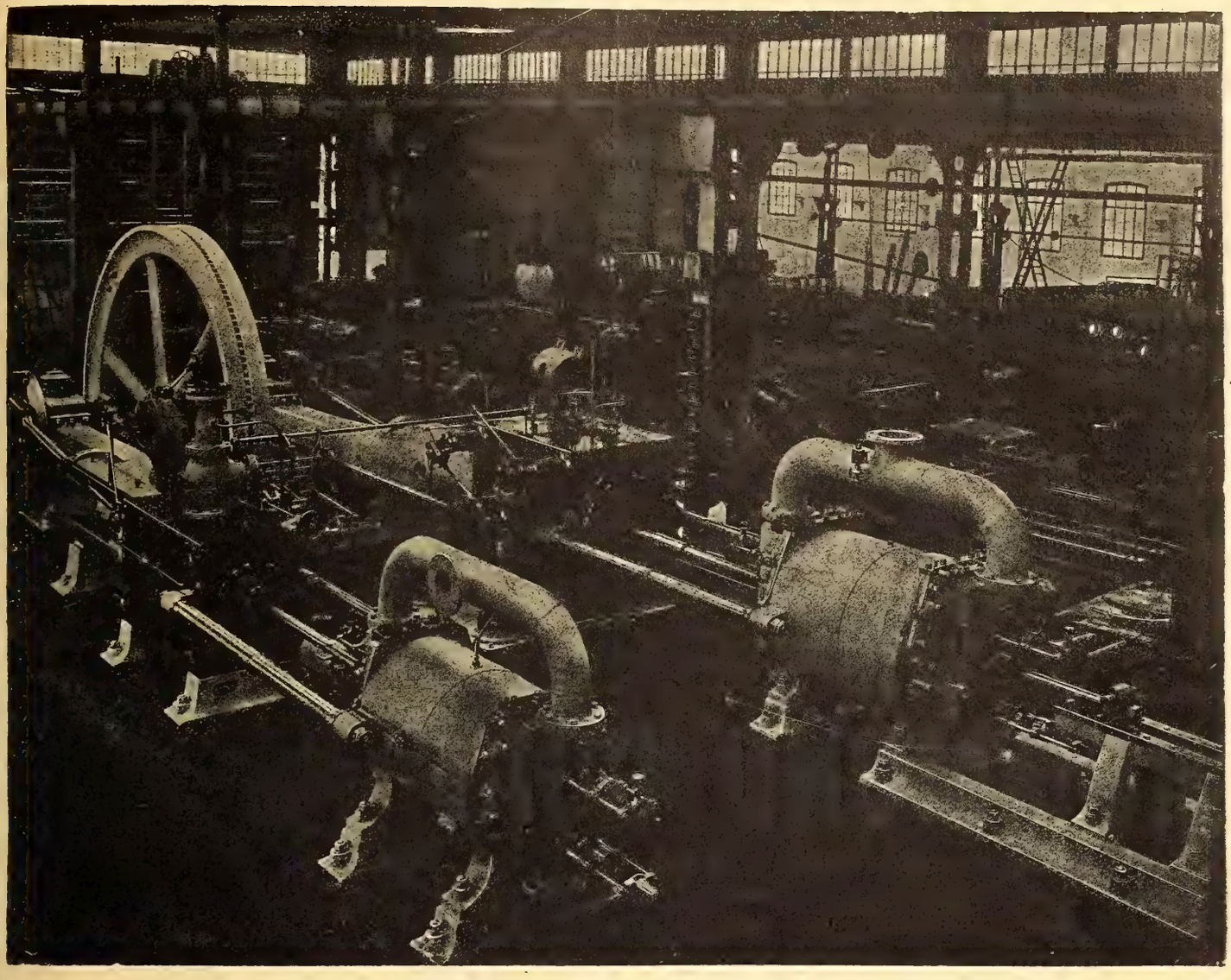

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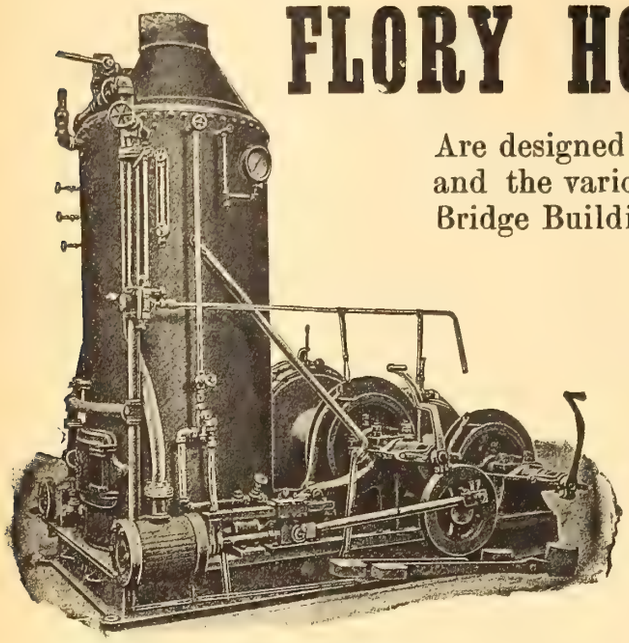

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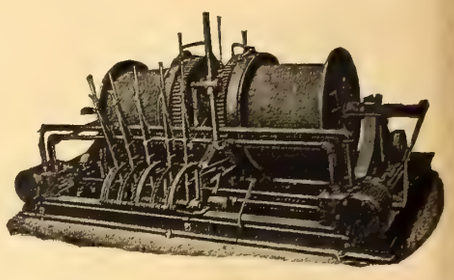

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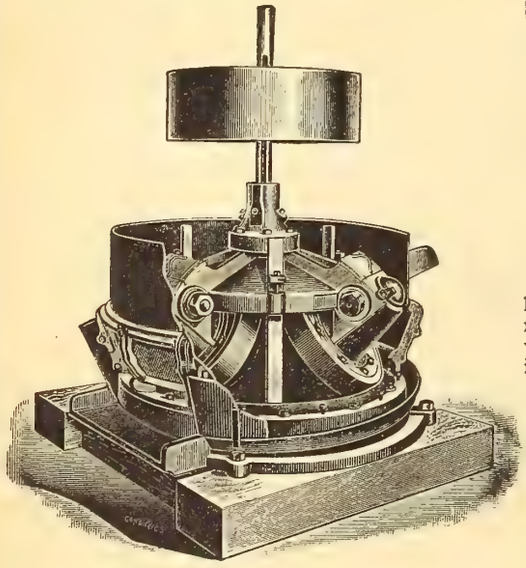

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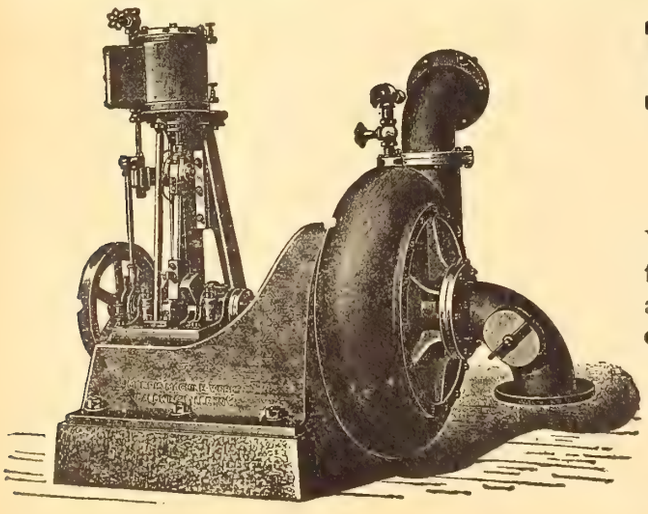

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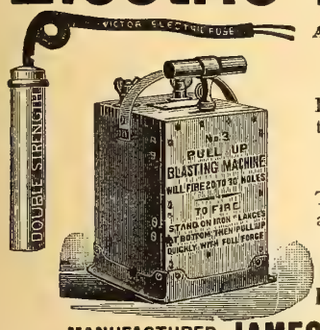

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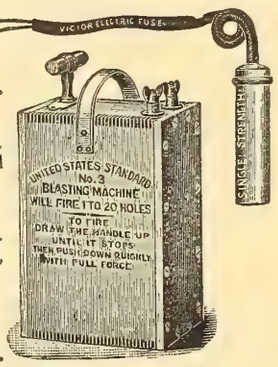

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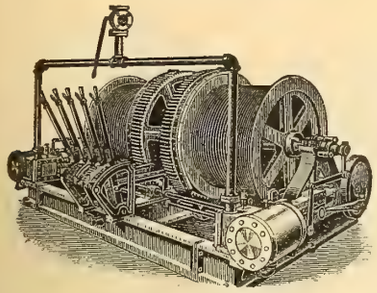

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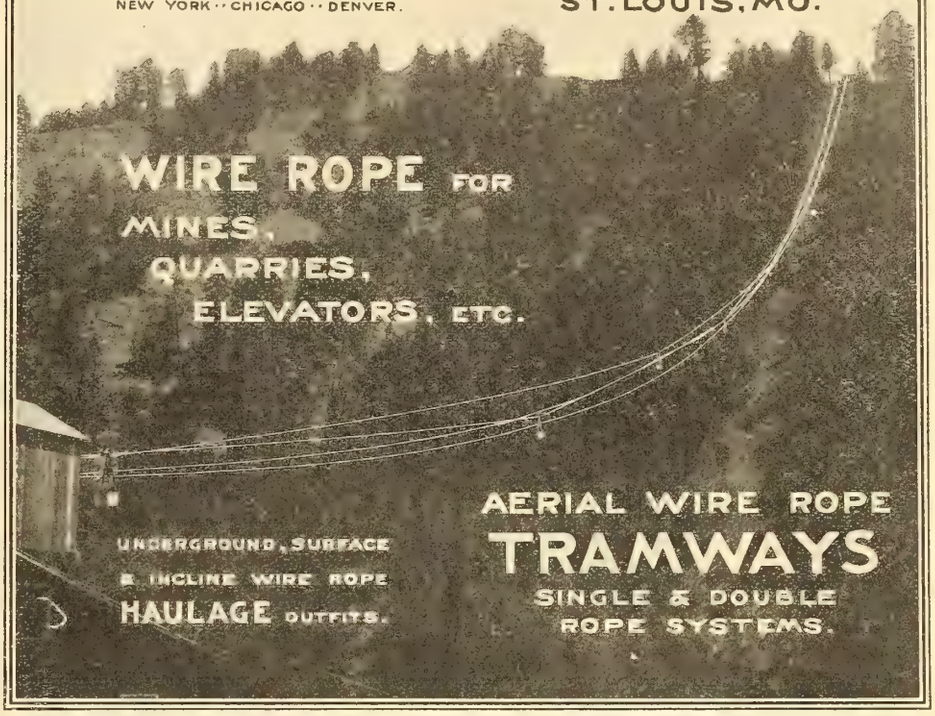

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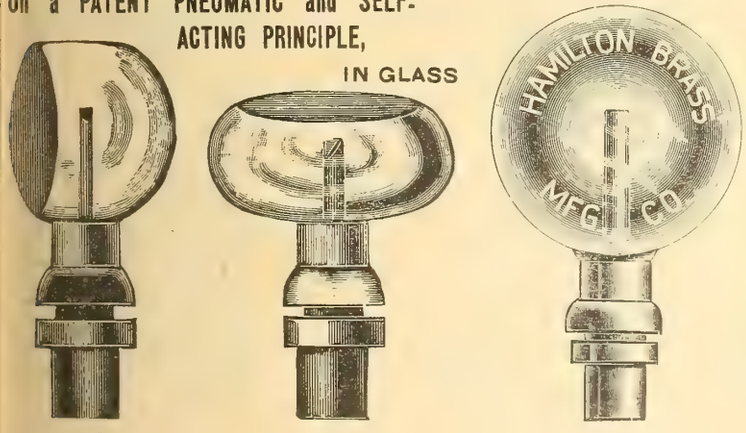

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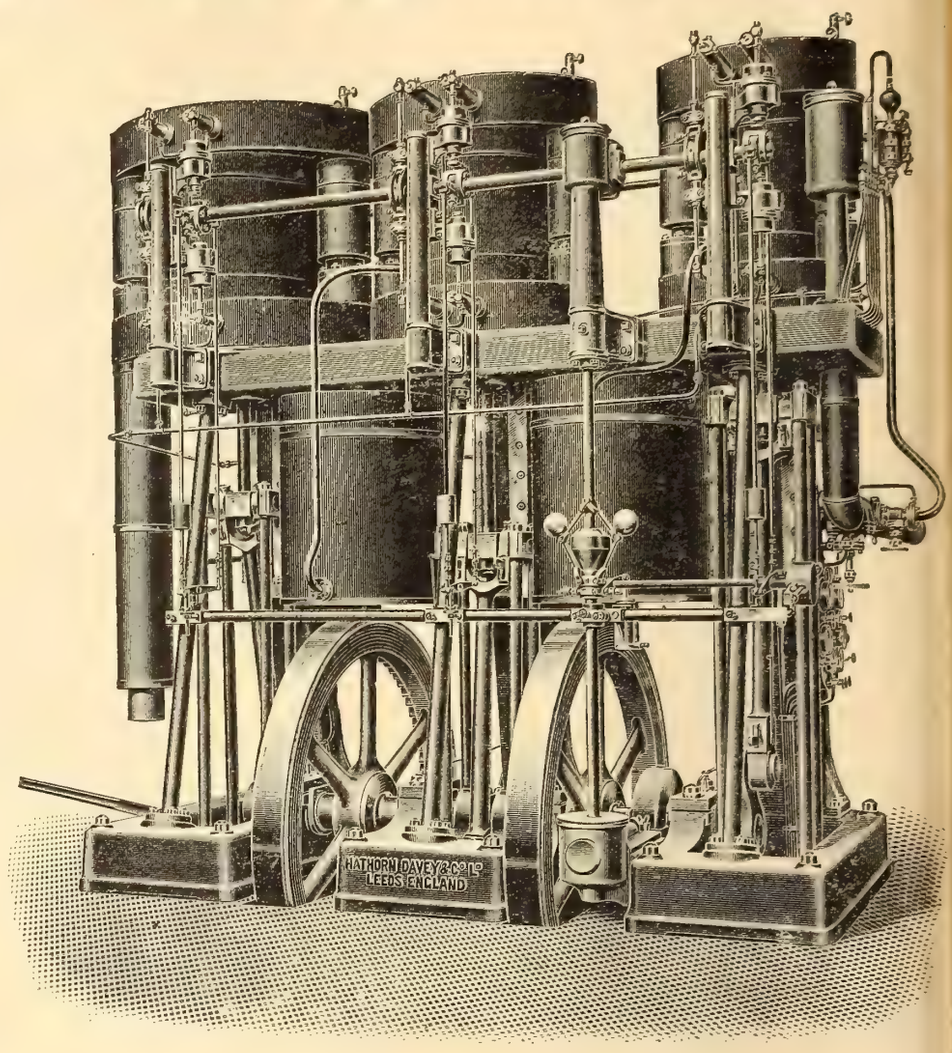

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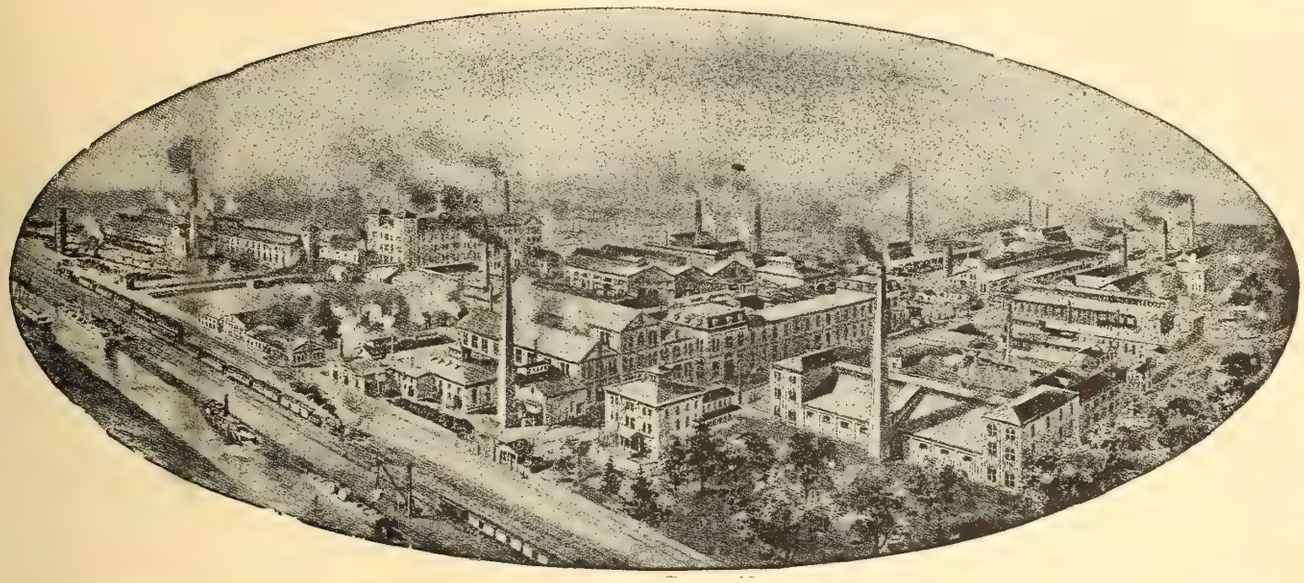

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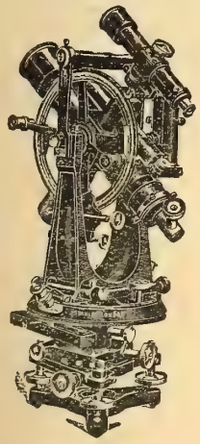

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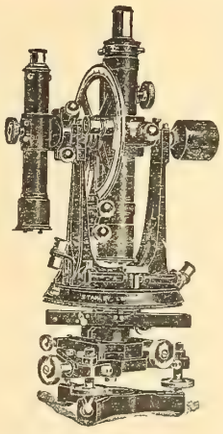

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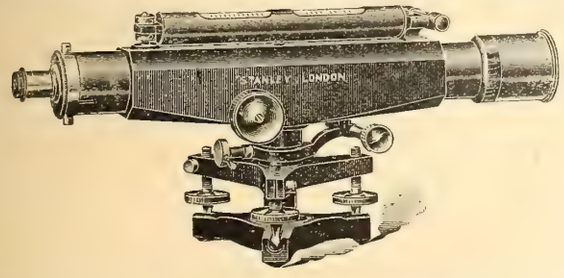

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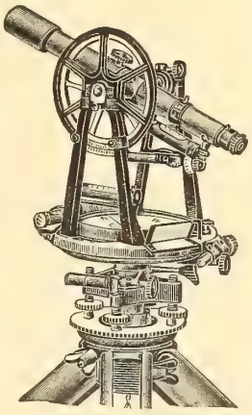

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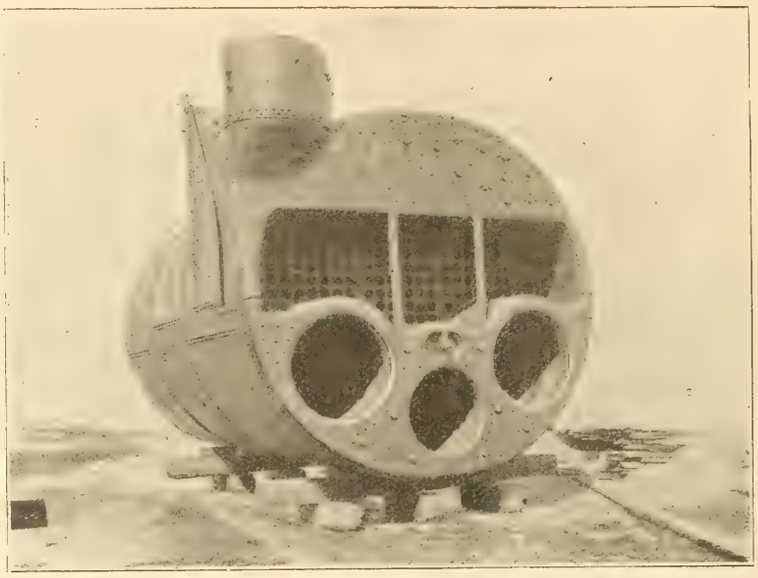

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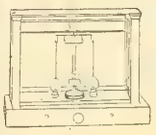

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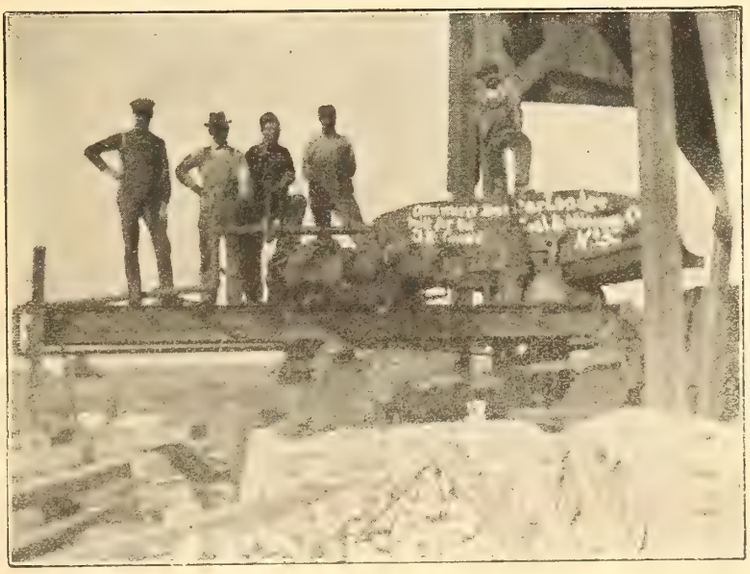

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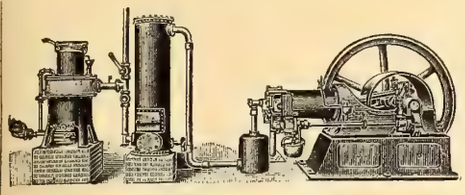

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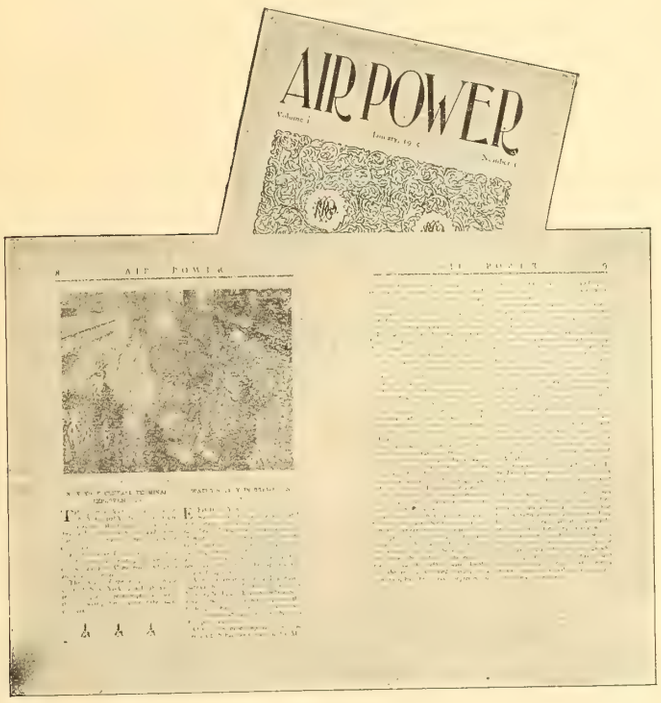

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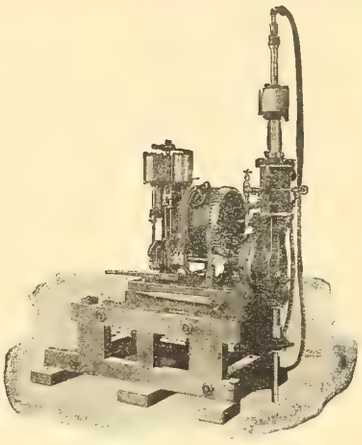

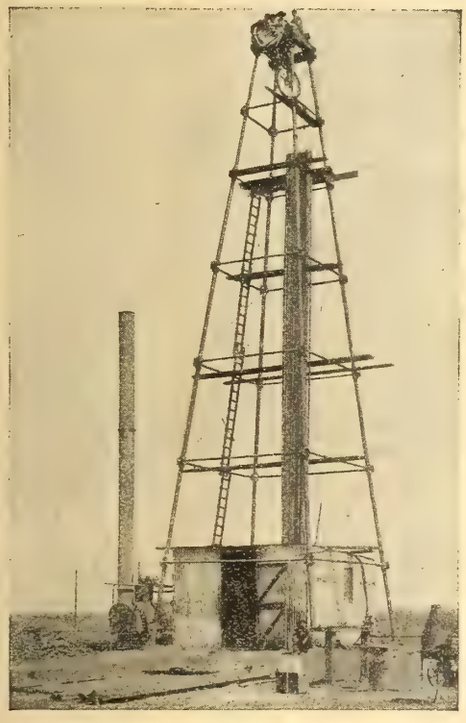

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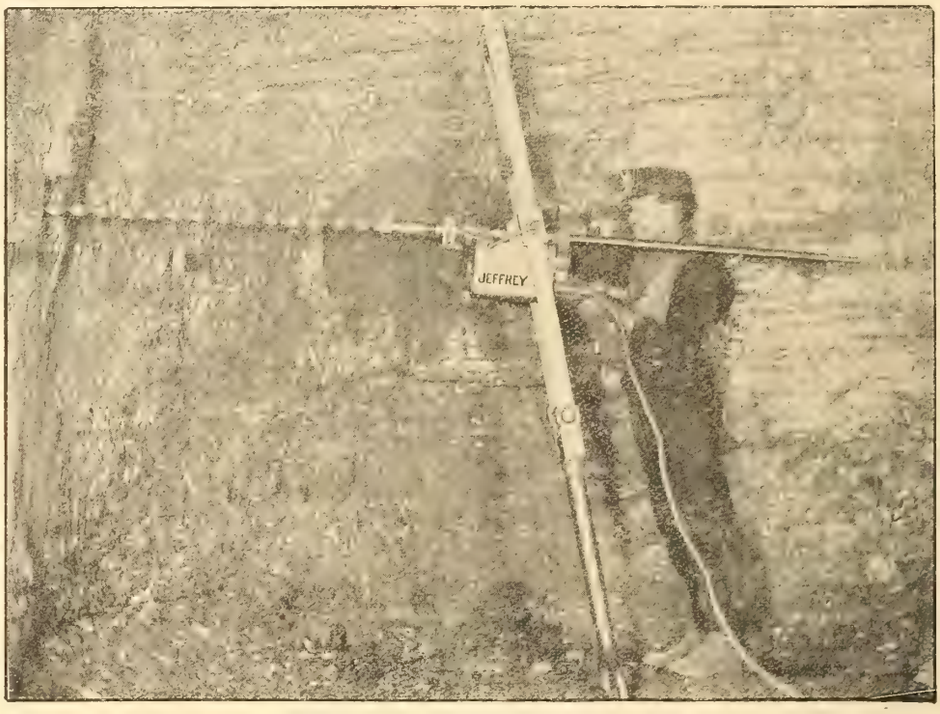

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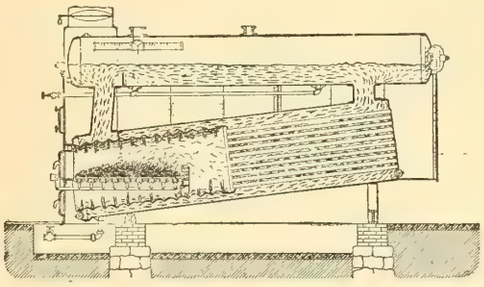

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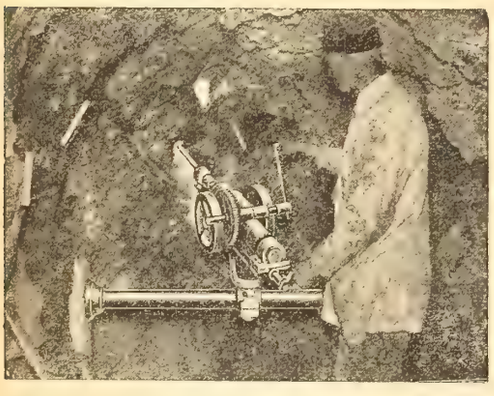

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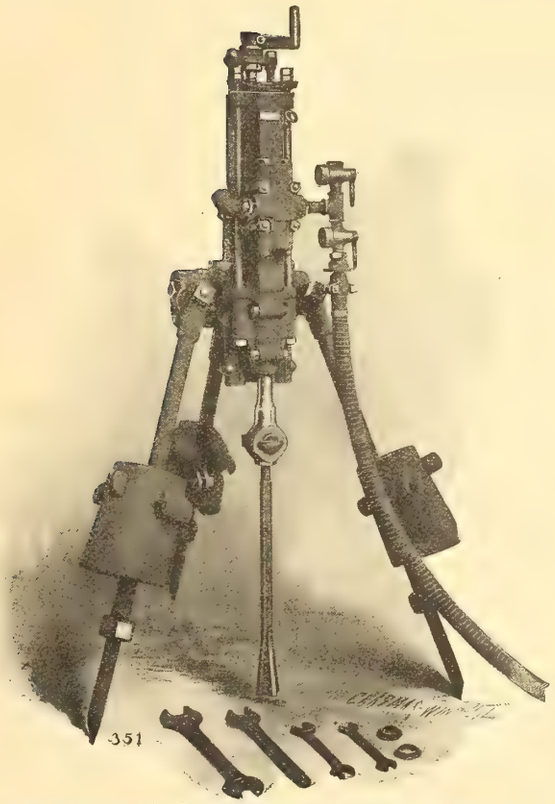

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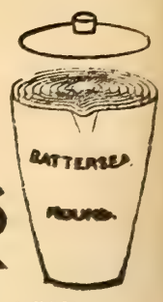

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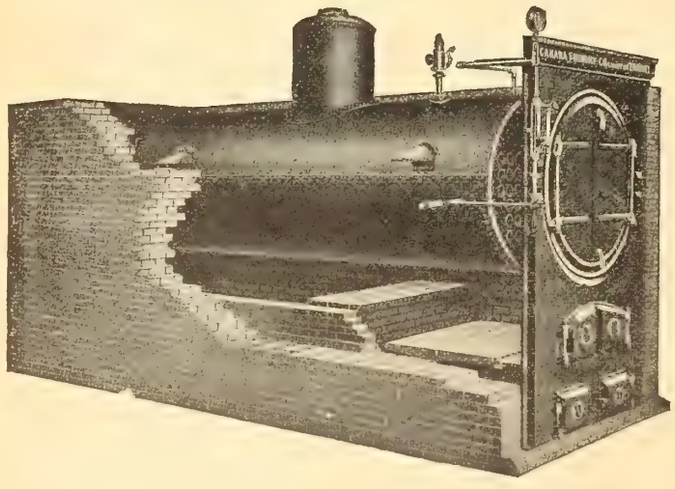

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The annual report of the Dominion Coal Company, of which a summary is given on one of our pages, alludes to the reimposition of the duty of coal going into the United States. The subject of taxing coal which is imported as well as of imposing a tax for the benefit of the commonwealth in which the coal is mined, has been engaging the attention of many minds, not only in Canada, but in the United States, and particularly in the State of Pennsylvania, where Governor Pennypacker has suggested the imposition of a tax for the benefit of road improvements and school funds; Governor Pennypacker is associated in his ideas with Governor White of West Virginia.

In the meantime, Nova Scotia is saying a good deal in the papers respecting the movement initiated in Ontario which asks for the abolition of the import duty on American coal. Among our news notes this month is an item stating that the Dominion Coal Company has determined to secure the Ontario markets for its own product. With all this flashing of battle axes by divergent interests, the real gist of the matter is obscured, rather than aided.

Up to the moment of writing, no additional authoritative information is available regarding the Rossland merger to which frequent allusion has been made in our columns. The REVIEW is given to understand from Toronto, that the hindrance to the programme comes from the divergent views of Mr. Waterlow and Mr. Blackstock regarding the situation of the head office of the combination. Naturally, Mr. Waterlow and associates desire the head office in London, equally naturally, Mr. Blackstock is reported as insisting that the head office shall be on this side of the water, and available for quick communication with the mining properties. We are distinctly of Mr. Blackstock's opinion, having always believed that the executive offices of a mine should be situated as closely as possible to the property itself.

Another rumor concerning the LeRoi consolidation emanates from the "Phoenix Pioneer," which is authority for the statement that the management of the proposed combination will be put in the hands of Mr. W. H. Aldridge, who at present occupies the position of general manager of the Canadian Pacific Railway's mining department. Mr. Aldridge is understood to be quite content with the position which he now occupies, and it is reported that he is ignorant of negotiations looking to his assuming the management of the consolidation.

It is reported that the effects of drying the blast before using it in blast furnaces, on the plan of Mr. James Gayley, of the United States Steel Co., are remarkable for both increased output of iron and decreased amounts of fuel. The burden of one furnace at Pittsburg has been increased from 2,516 tons per week to 3,129 tons, an increase of 620 tons, and the full burden has decreased from 2,147 tons to 1,726 tons; or, the fuel consumption per ton of ore was reduced from .85 ton to .55 ton. This saving of 3-10 of a ton of coke per ton of ore, with coke at $5.00 per ton, means a large saving, in this case nearly $4,700 a day.

The statement of the approximate valuation of the mineral production of British Columbia for 1904 shows an increase (over that for 1903) of all minerals, except copper. The largest metallic increase must be credited to lead, which shows about $800,000 advance over 1903. This is primarily due to assistance received from the Dominion Government in the shape of a bounty but is also somewhat due to appreciation in the market price of the metal.

The value to a commonwealth at large of such institutions as the Canadian Mining Institute is occasionally demonstrated, and the REVIEW is glad to be able to chronicle a recent instance.. In March, 1904, Mr. E. B. Kirby contributed a most valuable article on the ore deposits of Rossland, which was first published in the columns of the REVIEW, and afterwards incorporated in the Journal of the Mining Institute. Now, the Rossland Board of Trade has ordered the paper to be reprinted in pamphlet form, and has arranged for the gratuitous distribution of 1,000 copies. Probably no other brochure would have had as much effect in attracting the best class of attention to the peculiarities of the Rossland district as did this paper from the pen of one who has spent five years in the study and active management of two of the largest mines in the district.

Apropos of the discussion of the two per cent. mineral tax, which has been prevalent during the last two months in British Columbia, the REVIEW notes the resolution which was adopted by the Associated Silver Lead Mines at its recent meeting. Considerable discussion was evoked, but the resolution contains the following words:—"Resolved, that this Association approves of the principle of taxing the output of metalliferous mines.

"If it is deemed necessary to revise the present method of such taxation, it would advise that, before any change is made, a commission representative of the various branches of the metalliferous mining industry be appointed; such commission to have power to summon witnesses and examine mine and smelter books with a view to arriving at an equitable basis of taxation, the expense of such commission to be borne by the Government.

"Further resolved, that, if such commission shall find it advisable to amend the present method of taxing a smelter or mill return, this Association suggests taxing it on a rate to be fixed on the gross recovered value of the ore."

As against this, we note that a still more recent meeting of the Nelson branch of the Provincial Mining Association unanimously was in favor of a resolution to the effect that the tax on mines in operation should be solely upon the profits earned; and suggested that, in order to arrive at an equitable method of obtaining net profits, it be recommended that the deduction of the mine pay roll from the net smelter returns be considered, and, at the same time the resolution went on to acknowledge that the suggestion was a compromise for expediency. These two meetings of prominent and important associations of mine owners offer, we think, views in distinct opposition to each other. The REVIEW is glad to note that the Associated Silver Lead Mines have recognized the advantages of getting at net values, by the last paragraph of their resolution, in which is embodied the suggestion that the tax should be upon the gross recovered value of the ore. This is, in effect, what the REVIEW said in its comments on the letter of its esteemed correspondent in its February issue.

"The exhaustion of the known and payable mineral riches of South Africa must be a matter of many generations; and the greatest experts regard the already discovered resources of the region as but the fringe of what is to come. The probabilities are on the side of an almost indefinite extension of the gold industry; and South Africa is full of all sorts of other valuable deposits besides—coal, copper and oil among them. To talk of the day when there shall be no more mines in South Africa is as foolish as to prate of the time when there may be no British Empire."—The Critic.

Seventh Annual Meeting of the Canadian Mining Institute.

Held at Montreal, March 1st, 2nd and 3rd, 1905.

The seventh annual meeting of the Canadian Mining Institute opened its sessions with a business meeting at 10.30 a.m. on the morning of the first of March, President Coste in the chair.

The president welcomed the members to the meeting, and then presented the annual reports of the Council and of the treasurer, which he proceeded to read. The report of the Council showed that, although there had been a slight decrease in the number of regular members, there had been a large increase of students and affiliated members, and that the total membership of the Institute now amounted to about 480.

Three deaths of members had occurred during the year, namely, the late secretary, Mr. B. T. A. Bell, Mr. Cornelius Shields of the Lake Superior Company, and Mr. J. R. Gifford, formerly of British Columbia. In respect of all of whom the Council spoke in appreciative terms.

After the reports had been accepted by the meeting, the appointment of scrutineers for the election of Officers was asked for, and Prof. W. G. Miller, of Toronto; Commander A. P. Low, of Ottawa; and Mr. A. W. Stevenson, of Montreal, were appointed.

Mr. Geo. E. Drummond then rose to move a resolution, which, in effect, instructed the scrutineers to count both the green and the yellow ballots which had been in the field, and concerning which many circular letters had been sent to the members. The motion also declared in favor of recording votes from members who had written letters declaring that certain ballots had been voted by them, which ballots might or might not have been among the fifty-two ballots which were acknowledged by the president to have been destroyed. This motion was admirably put and spoken to by Mr. Drummond, was seconded by Dr. W. L. Goodwin, and had the immediate effect of reconciling diverse interests, and was unamimously agreed to.

Mr. E. D. Ingall, Statistician of the Geological Survey, asked permission of the president to call the attention of the members to the statement of the annual mineral production for the year 1904, which had been printed, and copies of which had been placed on the table for distribution among the members.

A number of invitations, to make use of the hospitalities of the Engineers' Club, the Canadian Society of Civil Engineers' rooms, to visit the Allis-Chalmers-Bullock's works, were read by the president, and thanks were given by the meeting to the corporations extending these courteous invitations.

After a few other unimportant items of business, the meeting adjourned until three o'clock in the afternoon.

The afternoon session opened at 3 p.m. with a statement from the president that, owing to the multitude of papers with which his luggage had been burdened, his annual address had been mislaid, and was, therefore, unavailable for the afternoon session, but he promised it for the evening session; and the first paper of the session, on "The Goldfield District, Nevada," by Mr. E. P. Jennings, of Salt Lake City, was then read. This paper dealt with the new district, which is some twenty-five miles to the south of the famous Tonapah District, and which has already shipped over $2,000,000 worth of ore, the value of which has averaged between two and three thousand dollars to the ton. Mr. John E. Hardman drew the members' attention to the fact that the first production in Goldfields had been made by a man formerly identified with the mining industry in British Columbia, Mr. L. L. Patrick, and also that the recently deceased member, Mr. John R. Gifford, had gone into the Goldfields District last fall, and, in working the properties which he had acquired, had caught that chill which resulted in his death shortly afterwards at his home in Haywood, Cal.

Mr. John Blue drew the attention of the members to some facts that had been communicated to him by an engineer resident in the district for some time, to the effect that the gold of the district was not found in the quartz veins, but was found in very considerable quantities in the rhyolite walls.

Mr. Hardman remarked that, in one of the letters received from Mr. Gifford, some occurrence had been noted that in taking down a piece of shaking hanging wall rock a rich deposit of metallic gold had been uncovered, from which a very considerable value was obtained.

Mr. Hardman also drew attention to the fact that Mr. Jennings had not mentioned in his paper the occurrence of any telluride ores in the section; that the speaker was advised, through correspondence, that a small amount of tellurium mineral had been found there, and that in consequence an analogy, whether correctly or not he did not know, had been drawn between the ores of Cripple Creek and those of Goldfields. The fact was merely mentioned as contributing, in a very small way, perhaps, to the information contained in Mr. Jennings' paper.

The second paper of the afternoon session was on the "Bedrock of the Gilbert River Gold Fields, P. Q.," by Mr. John A. Dresser, of St. Henry. In this paper, Prof. Dresser made a demonstration that the source of the gold deposits of the Chaudiere Basin and of the gold fields in the southeastern portion of the Province of Quebec were intimately connected with the eruptives, and constituted the underlying rock of the regions. Thus it had been found that the deposits of the Chaudiere Basin, of the Gilbert River, and the Famine and Desplantes Rivers were intimately connected with the underlying eruptives. The paper was discussed briefly, and the thanks of the members were given to Mr. Dresser for his contribution to the literature of the gold fields of Quebec.

A paper on the "Need of a Provincial Museum in Ontario," by Dr. W. A. Parks, followed. In the absence of the author, the paper was read by the president. Dr. Parks referred to the large sum of money which had been expended in making known to the world, through the St. Louis Exposition and foreign expositions, the natural products of Canada, and the extensive displays which had been made not only of the metallic wealth of the Dominion but of all its natural products, and asking the pertinent question: Why should not the same attention be directed to permanent exhibits of the same kind? He showed the stimulus to investigation which such exhibits gave, and the value of a collection representing the natural resources of the country, and instanced many cases of the utility of these collections to mining men and manufacturers. The need of such museums for each province was referred to, and the praiseworthy examples of museums in different States to the south of us and in the different kingdoms in Europe, were mentioned. Dr. Parks maintained that nothing could be of more value, both to the geologist and the mining engineer, than the creation of such museums, and said he believed that it was high time the example of other and more progressive countries was followed.

Papers on the "Bornite Ores of the Pacific Coast in British Columbia and the Yukon," by Mr. W. M. Brewer, of Victoria, B.C., and on "Varieties of Serpentine in Southeastern Quebec," by Mr. John A. Dresser, were also read, and briefly discussed. By vote of the members it was decided that, instead of the usual annual dinner on the evening of the closing session, there should be substituted a smoking concert, which met with the approval of the majority of the members.

At the evening session the president, Mr. Eugene Coste, delivered his annual address, which we present in full on another page. The first paper of the session was one on the "Artesian and other Deep Wells on the Island of Montreal," by Dr. F. D. Adams, of McGill University. The substance of the paper showed that, although during the last fifteen years a large number of deep wells had been bored upon the Island. Investigation showed that there was no definite water below the strata at any given depth. Out of eighty-nine deep wells which penetrated to depths ranging from 150 to over 1,500 feet, water was obtained in some and not in others. Underlying the city were the Trenton, Chazy and Calciferous formations, and water was found in all of these. In some cases no water had been found, and results of boring were extremely uncertain as to what kind of water might be obtained at any given depth, but as a general thing, the water obtained at a lesser depth than 750 feet (that is, in the Trenton or Chazy formations) was fresh water and palatable, although in some cases the water was too hard for domestic use. When the wells penetrated to the Calciferous formation, the water was usually sulphurous. As to the flow of these wells, the chances of obtaining a larger supply than about 5,000 gallons a day were about 7 to 9.

After a discussion, which was of great interest, Prof. G. R. Mickle, Toronto, read a paper on the "Value of Undeveloped Mining Claims," which was followed by a paper from Mr. Frederick Hobart, of New York, associate editor of the Engineering and Mining Journal, on "Canadian Metallurgical Products in the Far East."

Mr. Hobart pointed out that the mineral production of Canada was rapidly increasing along certain lines to a production which was greatly in excess of domestic needs, and that some outlet for the surplus of such production is needed. Mr. Hobart said that, to him, it had seemed that Canadian producers should look to the Far East rather than to Europe and the United States for such an outlet. China, Japan and India constituted a market for many metallurgical products which could be reached more easily and cheaply from the two ports of Vancouver and Victoria than from any other part of the Dominion. He alluded to the fact that one of the most important products of western Canada (lead) was shut out of the United States by a high protective tariff, and suffered disadvantages in respect to the European market by the long railroad haul to the Atlantic, and the subsequent long sea voyage to Europe, where it met with competition from the lead produced by the United States and Spain. Some Canadian lead had already been successfully marketed in the East, but

there was no reason why a larger quantity should not be sent. The market price of lead in the Eastern countries was governed by the London quotations, and there was every reason to believe that the lead would command a better return if shipped across the Pacific than if transported overland to European markets.

Mr. Hobart further mentioned the large copper production which British Columbia was now making, and alluded to the present great demand for this metal in China and Japan, owing to the Russo-Japanese war. He stated his belief that a permanent market, irrespective of the war, would be obtained there with only the expense of an ocean rate, leaving a large margin of profit for the producers. He also alluded to the large demands for bronze and brass in the East, and believed that a profitable market for British Columbia spelter could also be found there. He spoke briefly on the markets for iron and steel, and the advantage British Columbia has in possessing large quantities of good iron ore. Generally, the Far East needed metals, and he believed that Canada could easily have her share in supplying that demand.

THURSDAY'S SESSIONS.

Thursday morning was given up to the reading of students papers, which were contributed in competition for the president's medal and the annual cash prizes which the Institute awards to meritorious student papers. They were, generally, commendable, and provoked considerable discussion. We have not space to notice these in full, but hope to have an opportunity of printing the best of them shortly.

The session on Thursday afternoon continued the reading and discussion of papers set down in the official programme, and the president announced that the evening session would be devoted to papers illustrated by lantern slides, and for this purpose the courteous offer of the Canadian Society of Civil Engineers of their lecture room and lantern had been accepted, and that the members would meet, therefore, at 877 Dorchester Street for the evening session.

The first paper of the evening was an interesting address on electric smelting, given by Dr. Eugene Haanel, Superintendent of Mines, of the Department of the Interior, Ottawa. Dr. Haanel's address was an interesting and admirable summary of the extremely valuable monograph recently published on Electro-Thermic Processes for the Smelting of Iron Ores. Dr. Haanel began by drawing attention to the well-known fact that iron and steel were the foundation of all other industries, and that the country which required to import its iron was severely handicapped in the modern race for commercial success. As illustrating this point, he stated that during the fiscal years of 1903 and 1904 the Dominion of Canada had imported pig and bar iron, and manufactures of iron, to the value of $43,107,599, showing the dependency of Canada at the present time on other countries for iron in a manufactured state. The present demand was contrasted with the probable future demand, arising from the increase of population and the remarkable increase in business which had been witnessed during the last decade. Dr. Haanel alluded to the measures which had been passed by Parliament tending to the stimulation and encouragement of the production of iron and steel, noting the bounty on rails and the import duties on articles manufactured from iron and steel. The Doctor drew attention to the fact that blast furnace work had only been found possible in the East, and that good metallurgical fuel was found on both the Atlantic and Pacific coasts, therefore necessitating either a long haul of ore to the blast furnaces or a long haul of coal to the ore, should attempts be made to create an iron industry in the central portion of Canada. The Doctor spoke at length on the subject of electric smelting, describing the different processes which had been found commercially successful abroad, noting the limitations of some of these, and closing with the expression of his own opinion that we are on the eve of great achievements in the application of electric energy to the extraction of metals from their ores, and his belief that the undeveloped water powers of Canada would shortly be employed for the manufacture of different grades of iron and steel from ores which had been proved to exist in large quantities in the central portions of the Dominion. Dr. Haanel's lecture was an admirable presentation of the present condition of the art of electrically smelting iron.

Mr. J. Obalski, Inspector of Mines for the Government of Quebec, followed with a short paper on "A New Mining District in Quebec." Mr. Obalski's remarks were a resumé of the results of a trip which he was directed to make in the fall of 1904 by the Hon. S. M. Parent, Prime Minister, on application of Mr. Peter McKenzie, who has had business in that section for many years, and whose discoveries were deemed of sufficient importance to justify an examination of the district by a Government official.

The last paper of the evening was given by A. P. Low, who commanded the Government steamer "Neptune" during a cruise in the Arctic regions in 1903 and 1904. This address was illustrated with lantern slides of particular and exceptional beauty, and was perhaps the most interesting paper of the evening. Mr. Low mentioned the existence of a mica mine in Baffin's Land, now being worked in connection with a whaling outfit, which was paying handsomely. He dwelt upon the indications of copper ore which occurred along the eastern side of Baffin's Land, and upon immense coal fields, the outcrops of which were visible on islands to the north and west of Lancaster Sound. These deposits, although of great extent and of good quality, could not be made of value owing to conditions of climate. There were indications also of copper deposits on the western side of Hudson Bay, and of iron ores on the eastern side; none of these indications had been at all exploited. Also on the shores of Hudson Bay were outcrops of lignite, probably of the Tertiary period, which showed no evidence of disturbance by glaciation.

FRIDAY'S SESSIONS.

On Friday morning the entire session of the Institute was devoted to discussing the report of the Sub-Committee on By-laws, which committee had been in deliberation throughout the session. Prior to the opening of the meeting a draft of proposed by-laws, as suggested by the President, had been sent out to all the members in advance, and also a draft of the proposed by-laws, as amended and recast at a Council meeting held in January. The fundamental differences between the two sets of By-laws were confined to two points, the first of which was the establishment of branches of the Institute in different parts of the Dominion, wherever ten or more members of the Instiute were located in such section; the granting to such branches of final decision on matters of local interest; and the further important matter of arranging for the diversion of funds from the treasury of the Institute to the support of such branches. The second point of difference was in respect to the constitution of the Council, or governing board, of the Institute. The one draft proposed that representation should be made on the numerical basis of members resident in each province, allotting one councillor for each 15 members in good standing; the second set of proposed by-laws kept the representation of the Institute to four members of Council from

each of the four constituent provinces, (Nova Scotia, Quebec, Ontario and British Columbia). Mr. Geo. E. Drummond, Montreal, spoke against the representation according to numbers, stating emphatically and clearly that such a method would give the Institute a provincial flavour which might be very objectionable in the future of the Institute. He thought that too much attention was paid at present to lines drawn between the Provinces, could see no reason why such a principle should be perpetuated, and deprecated its existence. Prof. W. G. Miller strongly advocated representation in the Council according to strength of members in the various provinces, and Prof. Miller's view was endorsed by several of the Ontario members.

Mr. John E. Hardman, Montreal, drew attention to the phrases in the first and third paragraphs of the Charter granted to the Institute by Parliament, wherein the objects of the Institute were stated to be the promotion of the arts and sciences connected with the economical production of minerals and metals, and the taking of concerted action upon matters which affected the mining and metallurgical industries of the Dominion. Mr. Hardman suggested that, in view of the many difficulties which had arisen in the past six years of the Institute's existence which were directly attributable to the growth of provincialism and provincial ideas, the time was ripe for a departure from the old method of representation in the Council. He drew attention to the fact that, under the proposed representation according to numbers, British Columbia would have only three members and Nova Scotia but two members, whereas the Province of Ontario, whose mineral production was in no way comparable as yet, with either the westernmost or easternmost province, would have a representation in excess of the combined representation of those two provinces. In view of these existing facts Mr. Hardman endorsed the idea contained in Mr. Drummond's remarks, and moved an amendment to the effect that, the Council should be composed of 16 members at large, that such 16 members should be selected solely with a view to the representation of the most important mining and metallurgical interests of the Dominion, leaving it to the sound sense and discretion of the Nominating Committee to see that representation be made without regard to provincial lines. This view met with the approval of the meeting, and Prof. W. G. Miller seconded Mr. Hardman's amendment, which was carried without dissenting voice. The Institute, therefore, is now truly national as regards its Council, and is emancipated from any provincialism which may in the past have obtained. The disputed point as establishment of branches was properly left, in a suitable paragraph, to the discretion of the Council to establish, from time to time, such local branches as it might see fit, and giving to the Council discretionary power as to granting financial aid from the home treasury.

The section relating to the Nominating Committee was amended so that, as now adopted, the Nominating Committee is composed of one member from each of the four more important provinces, with one member at large to represent the Yukon Territory, Alberta and the smaller portions of the Dominion, and it was believed by all the members present that a committee so constituted would be more acceptable to the members at large and more apt to select truly representative officers, than has been the custom in past years. Some changes were also made in the manner of issuing ballots, which changes were in the line of advancement and improvement. The ballot which will be sent out in the future will distinguish the names which have been approved and selected by the Nominating Committee by an asterisk placed before the nominee's name; names not thus proposed by the Nominating Committee will be without the asterisk.

This session was the longest of all that were held, but the members may congratulate themselves upon having done more effective and valuable work during the Friday morning session than in any other session for some years past.

Friday afternoon's session opened with the report of the scrutineers who had been appointed to count the ballots and report the officers elected. Owing to the diversity of ballots which had been sent out, the fact that some of them had been destroyed, and that most of the ballots were scratched, the work of the committee had been unusually arduous, and, owing to the important discussions which took place during the morning session on the by-laws, Mr. Frederick Hobart, of New York, was appointed as scrutineer in place of Prof. W. G. Miller, who was the chairman of the committee to which the by-laws had been referred. The scrutineers' report was a unanimous one, declaring the following members to have been elected to their respective offices:—

President—George R. Smith, M.L.A., Thetford Mines, P.Q.

Vice-President for Nova Scotia—Thos. Cantley, New Glasgow.

Vice-President for Quebec—Dr. F. D. Adams, Montreal.

Vice-President for Ontario—Dr. W. L. Goodwin, Kingston.

Secretary—H. Mortimer Lamb, now of Victoria, but presently of Montreal.

Treasurer—J. Stevenson Brown, Montreal.

COUNCIL:

Nova Scotia—
- D. W. Robb, Amherst.
- Chas. J. Coll, Stellarton.
- C. A. Meisener, Sydney.

Quebec—
- H. J. Williams, Danville.
- R. T. Hopper, Montreal.
- J. Obalski, Quebec.

Ontario—
- Dr. A. E. Barlow, Ottawa.
- A. B. Wilmot, Sault Ste. Marie.

British Columbia—
- R. R. Hedley, Nelson, B.C.

On the retirement of President Coste from the chair, the new president, Major Geo. R. Smith, M.L.A., of Thetford Mines, Quebec, briefly acknowledged the honor which had been done to him by the members in electing him to the presidency, and declared his great confidence in the other officers who had been elected with him. He said that his sole ambition as president would be to carry on and perfect the great work for which the Institute had been organized. Major Smith outlined briefly the history of the Canadian Mining Institute, showing its gradual evolution and formation from the provincial organizations which had preceded it, and said that to-day it was an organization truly national, whose strength was known from the Atlantic to the Pacific, and the expression of whose opinion would have due weight with any government in the Dominion.

A vote of thanks to the retiring president was made, and then the session proceeded with the reading of additional papers, one of the most interesting of which was on the "Cobalt-Silver-Nickel-Arsenic Ores of the Temiscamingue District," by Prof. W. G. Miller, of Toronto.

The business sessions having closed, the evening was devoted to a smoking concert, which was truly representative, and was an exceedingly entertaining and interesting session. Outside and Institute talent were both freely drawn upon for songs and musical contributions, but an unexpected and most gratifying feature of the evening was an exceedingly able and instructive address by Mr. Frederick T. Congdon, ex-Governor of the Yukon Territory.

GOVERNOR CONGDON'S ADDRESS.

Governor Congdon began his talk with a brief reference to the good quality of the administration of law and order in the Yukon Territory, which was due, he claimed, to the excellence of Judge Dugas, whom the Province of Quebec had sent to the Yukon; and also to that glorious body known as the North-West Mounted Police. He paid a tribute to the excellent work which had been done by Comptroller Lithgow, and the general character of the support which the Administration received from its officials in the territory. In speaking of the methods of working which hitherto had been in use there, he mentioned the unsuitability of sluicing methods for mining on a large scale, and the probability of the adoption of hydraulicing to the frozen gravels of the territory. Formerly, it had been supposed that frozen ground could not be successfully worked by an hydraulic process, but it had been found that, during five months in the summer, the face of the ground would thaw so rapidly as to permit of most successful hydraulicing. Alluding to the supposed exhaustion of the gold fields of the Yukon, he claimed that this idea had gotten abroad because of the limits of ordinary sluice mining, and made the statement, without fear of contradiction, that the real mining days of the Yukon Territory had not yet begun, instancing the working of Gold Hill and other portions of the district as examples of what might be expected in the immediate future.

Mr. Congdon also alluded to the expensive mistakes which had been made in installing huge pumping plants for the purpose of pumping water to the hillside and bench gravels, mentioning one plant which had cost over $300,000 to install, which used daily, as fuel, from fifteen to twenty cords of wood which cost from $15.00 to $20.00 per cord. He also spoke of the work which was done last year in bringing in 3,000 miners' inches of water to a reservoir placed back of Dawson City, and its successful operation, and the further enlargement of the plant by the construction of a reservoir to afford a supply of 10,000 miners' inches, which had been built 600 feet above the level of the first reservoir, or 1,200 feet above the city of Dawson. As an example of good engineering this case was mentioned, and it was also mentioned as testimony that corporations in the Yukon were not disposed to be exorbitant in their charges, since the company which had built these reservoirs and ditch lines was willing to sell water at the rate of five cents per miners' inch per hour. Mr. Congdon also mentioned the new finds of coal which had been made recently, and which had proved to be of a superior quality, and also spoke of the deposits previously found on Coal Creek and vicinity. He referred to the fact that coal seams had been found near White Horse which afforded both good coking coal and anthracite, or coal of anthracitic nature. The copper deposits of the White Horse section were also mentioned, and a brief account of the Copper King mine given. This deposit of the Copper King is eight feet in width, and gives an average of twelve per cent of metallic copper; contained in this eight feet width is a streak of from five to eight inches of pure bornite.

Mr. Congdon concluded with an expression of his strong desire that the Canadian Mining Institute, as a body, might shortly be able to visit the Yukon Territory, where, he assured them, the inhabitants would give them a most cordial reception. He spoke encouragingly of the value and utility to Canada of a body of men trained and educated as the members of the Institute were, and closed with an expression of his sympathy with the aims and objects of the Institute, and appreciation of the privilege which had been extended him of addressing the members upon the subject of the Yukon.

Dr. W. H. Drummond contributed several recitations from his writings which, as usual, were very highly appreciated.

This annual meeting probably had more important work before it than any annual meeting which has been held since the inception of the Institute in '98, and the members may be congratulated upon having discharged important duties efficiently and promptly. The meeting was also marked by the presence of several gentlemen, whose attendance from distances was appreciated. Mr. A. C. Garde, of British Columbia; Mr. Frederick Hobart, of the Engineering and Mining Journal, New York City; and Mr. W. J. Johnston, publisher of the Mining Magazine, New York City, were interested attendants, and some of these gentlemen participated in the discussions and conduct of the meeting. Mr. Johnston was so much interested that his application for membership was sent in during the meeting, and he returned to New York having been duly elected a full member of the Canadian Mining Institute.

The Mine Fire at Dominion No. 1 Colliery.*

By SHIRLEY DAVIDSON and NORMAN MCKENZIE.

Dominion No. 1 Colliery, one of the oldest in Cape Breton, was first opened in 1831 by the General Mining Association. After abandonment for some years it was acquired by the Dominion Coal Co., in 1893, and was reopened by the present shafts and equipped with modern machinery. The mine has three shafts, one each for coal, air and supply of materials.

The bankhead consists of a steel structure containing modern appliances for picking and screening coal and delivering it to the railway cars, there are also belt conveyors to carry coal to the boilers of the plant and to the Company's locomotives. The colliery uses 46 coal mining machines. The colliery, at the time of the fire, was producing on an average 55,000 tons of coal per month, and employed about 800 men.

The main or coal shaft, generally used as an upcast—although the current may be reversed—is 154 feet deep, 10½ feet wide by 24 feet long, and consists of three compartments, two for coal and one for men. The Fan shaft, 143 feet deep, 11 in diameter, can be connected to either one of the three fans, and is generally used as a downcast. The material shaft, 135 feet deep, is 10 feet wide by 18 feet long, and also contains the endless haulage ropes, which are brought to the engine house located on the surface directly alongside.

These shafts are sunk about 1,900 feet south easterly from the crop of the Phalen seam. The surface in the vicinity is 89 feet above sea-level, while the pavement is 68 feet below sea-level. The ground slopes gently to the shore line of the Atlantic Ocean, distant 1,800 feet, where it breaks abruptly into low cliffs, exposing the seams of coal and the remains of

* A paper read before the Mining Section of the Canadian Society of Civil Engineers.

some old workings, supposed to be those of the French many years ago.

The Phalen seam averages about 8 feet 4 inches of clear bituminous coal, which dips in an easterly direction, the angle, or inclination, of dip being about 1 in 15. The floor of the mine is a very gritty shale, and the immediate roof is also a shale, which readily falls at times, but is easily supported by timber. The plan of working is the ordinary "room and pillar"; the deeps, headways and levels are driven 12 feet wide, and the rooms 22 feet wide. The size of the pillars left is 25 feet by 70 feet. The present faces of the workings have reached a distance from the shaft of 5,700 feet in the North deep, 5,400 feet in the South deep, and 3,000 feet in the Angle deep. The overhead cover at the face of the North deep is 519 feet thick.

The mine made some 500 gallons of water per minute, but had also to take care of 800 gallons per minute from the Main and French slopes of the Reserve Colliery, which quantity passed through a borehole in the barrier separating Dominion No. 1 from Reserve, and flowed along No. 3 South level to the water lodgment on the back North deep, from which it was pumped to the lodgment at the shaft bottom through a 7-inch pipe. There are three water lodgments in the pit, one of 500,000 gallons capacity is located at the shaft bottom, one of 500,000 gallons capacity is about 2,000 feet from the shaft on the North back deep, one of 900,000 gallons capacity is at the face of the South deep as shown on the plan. The first two are connected, as noted above, by a 7-inch pipe laid up the North Main deep, the lower pumping into the upper from two three-hundred gallon Cameron pumps: the upper then discharges vertically up the shaft to the surface through one 300 gallon Cameron pump. The lodgment at the face of the South deep contains a 1,000 gallon duplex pump, which discharges vertically 430 feet through a borehole into the International Mine, from whence it flows by gravity to the sea. Another borehole driven from the surface, 519 feet in depth, contains the steam and the exhaust pipes one within the other. Steam is supplied by the boilers at International Mine, located on the surface almost directly overhead.

The underground workings of Dominion No. 1 cover an area of 560 acres, and had produced from this area approximately 3,400,000 tons up to the time of the fire.

Inflammable gas is met with in very small quantities, but an efficient amount of ventilation is maintained by a powerful 24 feet Dixon fan, which circulates 114,000 cubic feet of air per minute.

A water service is maintained on the surface through a 6-inch pipe leading from a small stream distant about a mile from the colliery. An efficient supply is kept up by a 250 gallon Knowles pump. The stream is dammed, and forms a reservoir capacity of 7,000,000 gallons on the edge of which is located the boiler, pump and pump-house.

About 3.30 in the morning of Thursday, March the 19th, 1903, a workman returning from work discovered fire in a cross-cut between the Back and Main North deeps, near No. 3 Landing, about 1,200 feet from the shaft bottom and about 147 feet below sea level. The opinion is that it was started on the back deep side of the stopping by a workman carelessly throwing away the lighted wick from his lamp, or, contrary to all rules and regulations, kindling a fire in order to warm tea. This back deep is used as a travelling road, and the stopping in question was the same as all others built in the cross-cuts in the pillar between the Back and Main North deep. It was composed of hemlock boards lined with brattice cloth: the average width of this particular cross-cut was 12 feet. Some loose boards were lying alongside, and it is probable that some rubbish had also collected.

On account of the location, the fire was an exceedingly difficult and dangerous one to deal with. Alongside of it to the North was an old and abandoned section, where some time previously a bad crush had made it necessary to protect the pillars along the travelling road with a considerable number of props lagged behind. The workman who made the discovery, instead of making any attempt to stamp out the fire, as might have been done in this early stage, fled to the shaft bottom. This he reached after a difficult passage through the smoke, which quickly collected and poured up both North Deeps with the air current to the shaft.

He gave the alarm to the underground manager, who, with an overman, immediately travelled directly towards the fire, through the smoke, on the Back Deep. Orders were given to the bottomers to follow down with buckets. When within seven hundred feet the glare of the fire was distinctly seen, extending across the Deep, and when the cross-cut was reached, the place was a mass of flames, and the top of the coal was scaling.

A shovel—the only appliance at hand—was of no practical use; it was impossible to get about the fire, on account of the dense smoke, and the underground manager, seeing that the fire was beyond his control, made for the shaft bottom for proper appliances and more help. The men at the bottom refused to give this, so he started back alone, but this time by way of the Angle Deep and No. 6 North Level, where he met some miners who followed him to the fire.

Orders had been given to send down hose to connect with the seven-inch discharge from the lodgment nearby. The first lot was abandoned on the Angle Deep so that this connection was not made until the arrival of the second lot by way of the South Deep.

Assisted by the air current the smoke quickly gathered in volume, and barred all entrance to the pit by way of the shaft. Mr. McKenzie, the manager, who was immediately notified, was compelled to enter the pit by the travelling slope, which is driven from the crop, north of the shaft. He first reduced the speed of the fan. On the way down he gave orders to remove the horses, but all were suffocated before this could be done. As travelling by either of the North Deeps was impossible, he proceeded over the air crossing at the fan shaft bottom and through the fan shaft to the South Deep, and down the South Deep to the fire.

Timber and brattice were then put up across the main deep as the only possible means of excluding air from the fire.

The seven-inch discharge line from the lodgment nearby was broken, and after considerable delay in receiving the hose, two lines were connected to it. One was carried directly to the fire cross-cut, while the other worked through the first cross-cut above the fire in the Main North Deep.

By this time the roof of the back deep had already fallen, so that it was impossible to follow the fire through the cross-cut, where it had started and the work of extinguishing was therefore practically confined to the Main Deep, which was not so badly fallen, and, therefore, more accessible.

The morning of the fire it was difficult to persuade the men to work, as the conditions were very similar to those at Caledonia not long before, when a fire broke out in that colliery. There, an explosion occurred, causing the death of eleven men, including the underground manager, who had formed a party to locate it. In both cases the fire was near old and abandon-

ed workings filled with damp. This made the men nervous and afraid for some time, but after the first day there was no difficulty in obtaining all the men required.

The managers from the different collieries came and brought with them their subordinate officials and any men who had had experience with fire in a mine. These were organized in three shifts, of eight hours each, one of the managers being in charge of each shift, with a mine official leading each gang. Each shift was composed of five gangs who fought the fire from different points.

The fire brigades from Glace Bay and Sydney composed some of these gangs, and brought with them all the available hose. Besides those fighting the fire, a gang on each shift moved coal cars, mining machines, mine tools, etc., from the pit. Another was kept busy sending down material, such as brattice cloth, timber, etc., while a third took charge of the ventilation, and was supposed to travel all the places clear of fire and smoke and to see that no gas accumulated in any part of the mines.

Two more lines of hose were now laid from the material shaft down the South Deep and across to the Middle Deep, one working from the top cross-cut, into the Main Deep, while the other was carried down to the next cross-cut in the middle deep. An ample supply of water was kept on these by means of two 500 gallon pumps, which were temporarily set up alongside of the railway by the dam and driven by steam from a locomotive standing on the track. Two lines of wrought iron pipe 5 inches by 4 inches respectively were laid from this point along the surface to the shaft where the hose were connected and dropped to the bottom. It was now impossible to ascertain the distance the fire had travelled towards the pit bottom on the Deep Back, as the only two cross-cuts available were those between the Middle and North Deeps, and these were being made use of to fight the fire on the Main Deep. Smoke barred all other passages to the Back Deep. This being the case, an attempt was made to reach a point 600 feet above the fire cross-cut, on the Back Deep by following down the old horse road north of the Back Deep. After several attempts this point was reached, but the smoke was so thick and the heat so intense, that while only a short inspection could be made, it revealed the fact that the Back Deep had fallen in up to this point, although no fire was in sight. The drain which carries some of the water from Reserve through the rise workings of Dominion No. 1, amounting to from 500 to 1,000 gallons a minute, was also diverted to this point and allowed to flow into the Back Deep.

As, contrary to all expectations, the fire was not seen at this point, another attempt was made to reach it in this crushed district through room 30, which intersects the Back Deep a short distance above where the fire started. The object of this was to find out if the fire had worked its way through the stone stoppings which separate the Back Deep from the crushed and abandoned area, and also, if possible, to break through these stoppings and adopt the same method of fighting as on the Main Deep, namely before and behind. This method promised reasonable hope of success.

On the night of March the 23rd, 1903, after a very difficult and dangerous passage along room 30, a point was reached 750 feet from the Angle Deep and 200 feet from the Back Deep stopping, where it was discovered that the fire was making way into the old rooms. The necessary pipe had been laid down the Angle Deep and hose had been carried along to this point and were ready for use, but to attempt to extinguish the fire by this means in this old and abandoned section with its scores of openings, dangerous roof and stone filling was absolutely useless and a waste of time.

The work of fighting the fire from behind on the Main Deep and watching it at the first cross-cut from the Centre Deep was continued under the most disheartening circumstances, for the conditions were most unfavorable, as the section was the worst in the mine. The behaviour of the men was splendid, although they knew fire damp existed, and there was constant danger of an explosion; and, in spite of smoke, heat, and falls of roof which drove them back time and again, they stuck to their posts till all hope of saving the mine was abandoned.

The fire was now travelling so rapidly, that fears were entertained for the safety of the shaft, the loss of which meant the loss of the pit. A careful survey was made of No. 4 North Landing to ascertain if it was possible to construct dams of sufficient strength to retain water in this section, but the pillars were so badly crushed and the roof so badly fallen that this was considered impossible.

The question of submerging the whole of the north side was abandoned for the same reasons. In the meantime two dams had been built across the roads connecting the North and South Deeps in order to protect and keep in operation the big 1,000 gallon pump, which took care of the water from the lower section of the pit. These withheld a considerable amount of water in the north side and kept the pump for the time being from being submerged by the water which was now entering the pit in considerable quantities through the hose and drainage from Reserve. In order to ascertain how far the fire had travelled up the Back Deep during this time, Mr. McKenzie (and several others) after several unsuccessful attempts in which the lamps were extinguished by damp, finally succeeded in reaching a point 600 feet above the fire cross-cut, where it was discovered that the fire had passed this point, and was quickly approaching the shaft.

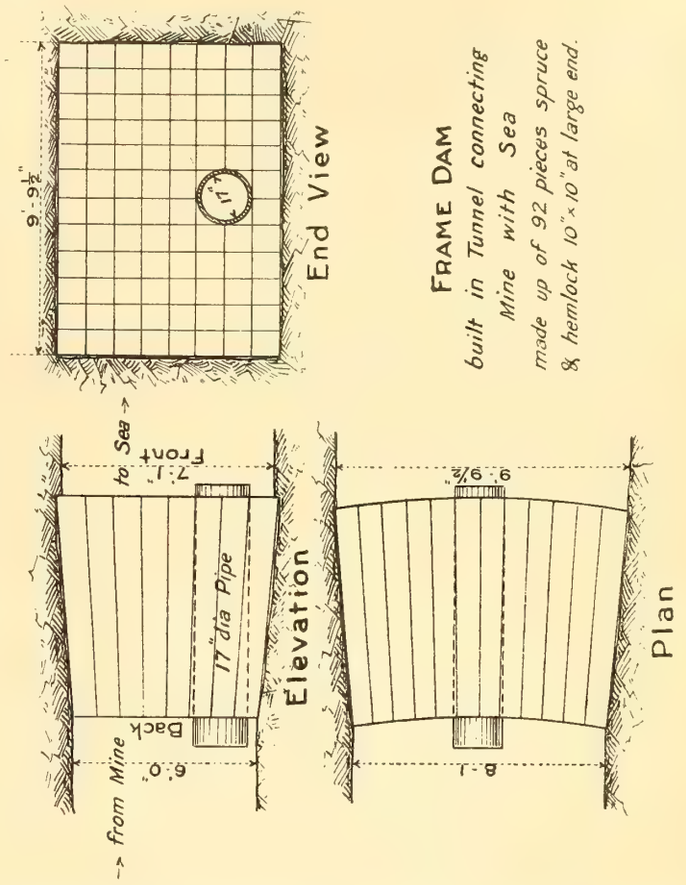
After this discovery on Saturday, March 28th, 1903, nine days after the fire started, complete submersion was decided upon. All the mining machines, with the exception of two, 280 pit tubs, all miners' tools, all horses, including the dead, were removed from the pit, together with parts of the electric locomotive. The mine was then sealed as closely as possible to prevent air entering to the fire, but it had been worked in so many places under a cover of only 100 to 200 feet, and the falls caused by drawing the pillars had extended to the surface, thus making it impossible to exclude the air completely, even after taking all possible precautions.

No time was lost in turning on water from all the available sources of supply. Through an old room in the rise workings, a drain was driven through to the crop to catch the water of a small brook flowing by this room. One 1,000 gallon Northey pump and two portable boilers were set up on the shore of Lingan Bay, distant 800 feet from the travelling slope. An 8-inch pipe was laid between these boilers and the mouth of the slope. This water, together with that from the small brook, united with the drainage from Reserve and flowed down the travelling road into the Back Deep, 700 feet above the fire cross-cut. This amounted to 1,350 gallons per minute, or in the fifty days from April 1st to May 20th, to 97,000,000 gallons. It was estimated that 516,000,000 gallons were necessary to bring the water to a level that would cover the fire area which now extended nearly to the shaft bottom.

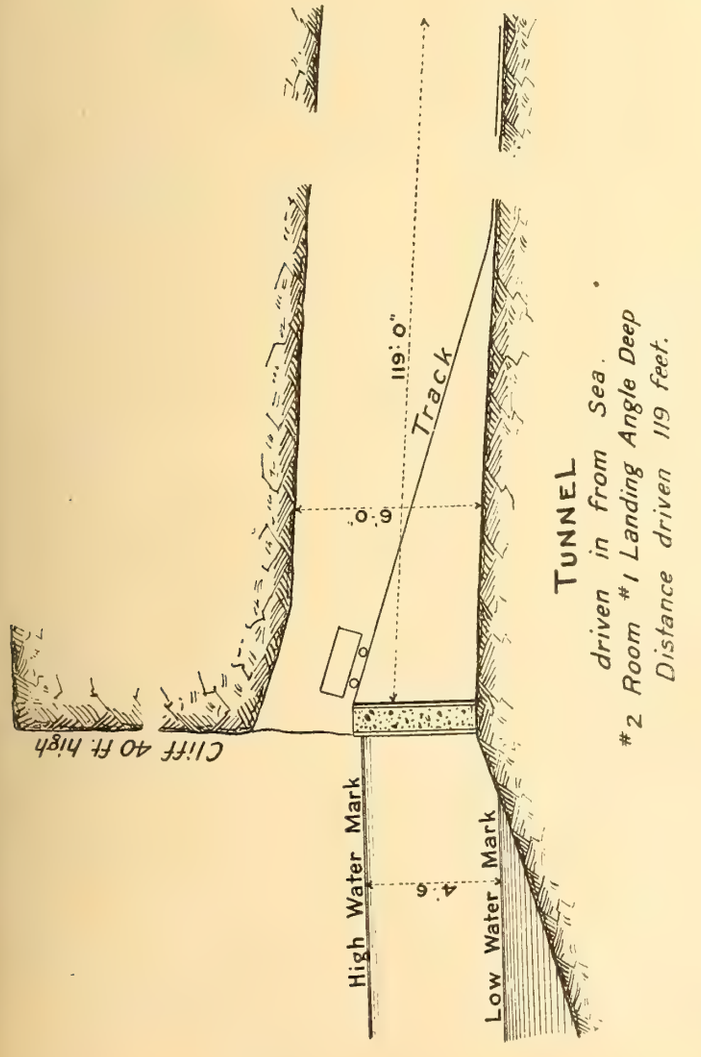
To have filled the mine from this supply alone would have taken many months. To hasten the submersion, it was decided to call into requisition the waters of the Atlantic. A tunnel

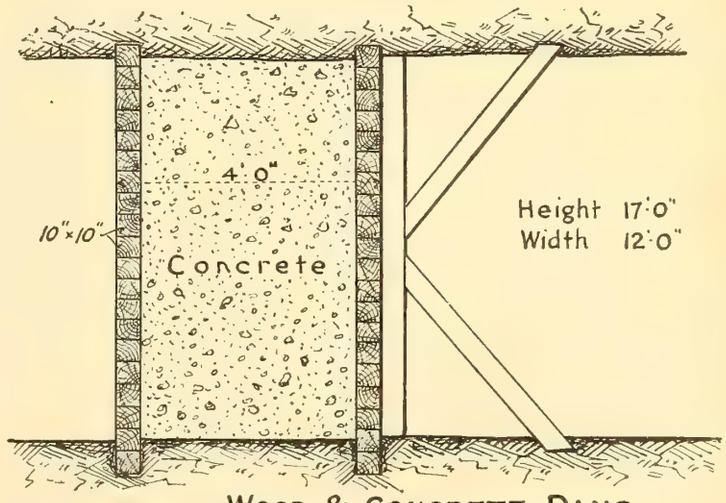
119 feet long, 6 feet high and 6 feet wide was driven in from the shore to the nearest room, which was Number 2. This was driven in four days, or an average of 30 feet per day by machine cut, for which an air line had been laid along the surface from the compressor house. The coal was loaded in a tub placed on the track laid for the purpose, and hauled out to the shore by hand. While the work was in progress a temporary dam was constructed across the opening, in order to seal off the pit at high tide, when it would otherwise have filled the tunnel, and delayed the work. This was composed of two walls of three inch plank separated by an eight inch space, which was filled with concrete. A sliding door four feet by four feet, located above high tide, afforded a means of entrance and exit to and from the tunnel. Beneath this, after completion, another door, four feet by four feet, was cut and used as a means of regulating the flow of water into the pit. The sea was first let in on April 7th and finally closed on May 23rd—a period of 46 days—but the flow of water was not continuous. The actual time of flow in this period amounted to fifteen days, during which it is estimated that 420,000,000 gallons entered the pit at a rate of 28,000,000 every 24 hours. 96,000,000 gallons entered by the other means mentioned, which totals 516,000,000 gallons. This brought the water level with the bottom of the shaft.

After the pit was submerged the opening was stopped by a permanent dam, which consisted of 92 pieces of spruce and hemlock (10 inches by 10 inches at one end, and eight inches by 10 inches at the other end) each piece being faced on two sides with one inch pine boards. Its thickness was about seven feet. Through the lower portions of this dam a 17 inch diameter pipe was laid with a plug at the lower end, which was forced into the pipe by the pressure of the sea when the flooding was completed.



Readings of the rise of water in the pit were taken by means of a float and wire dropped down the borehole to the face of the South Deep. The waters of the sea were shut off from time to time on the assumption that large quantities were withheld in the upper workings by falls and other obstructions, as the borehole readings showed that water raised the level at the borehole for several days after the sea was closed.





Wood & Concrete Dams
On Level connecting Main and French Slopes of Reserve.

Another source of anxiety and cause of delay in flooding was the question of strength of Reserve Barrier. Below No. 5 South Level of Dominion this was sufficiently thick to withstand the pressure brought to bear upon it, but above that

point (or from the bottom of Reserve Main Deep) the surveys showed varying thicknesses. The water from the Main and French slopes of Reserve flowed through a borehole driven through the barrier at a point in the face of No. 3 South Landing of Dominion, and here the thickness was 53 feet. The face of the Reserve Main slope is 198 feet below sea level which, when the water was on a level with the bottom of the shaft, was under a level of 130 feet, or 57.2 pounds per square inch, which equals 4.1 tons per square foot. To guard against any possibility of accident through the failure of the barrier, and in order to protect the workings of Reserve other than those of the main slope, two dams consisting of ten inches by ten inches spruce and hemlock laid in two walls with four feet of concrete between were built across the narrow places of No. 10 Landing, which was the only connection between the main slope and the rest of Reserve. The barrier, however, proved effective. The water worked through the strata and came in in considerable quantities through the roof between No. 9 and No. 11 landings, but outside of heavy condensation on the face of the barrier no other noticeable features developed.

The filling continued as above described until the readings taken at the borehole indicated that the water had reached the bottom of the shaft, but a float lowered into the shaft showed that the water had not reached this point. A close examination of the borehole was then made, and it was found that water bailed out by a bucket lowered the water about 25 feet, showing that the readings taken were not a true indication of the rise of the water in the pit. This method was therefore of no value, and, without any other gauge, the regulation of the flow of water became a matter of judgment.

On April 30th, 21 days after the mine had been first sealed, steam in place of smoke began to issue from the test holes in the shaft, proving that the water instead of being on a level with the bottom had apparently only reached the fire territory. An additional 250,000,000 gallons was therefore necessary to cover this.

Great care was taken to keep the water from actually covering the shaft bottom, as a rise above that point would entail much extra labour and loss of time in pumping out, for then the pumping would have to be started by way of the travelling road and by placing some pumps in the shaft. To provide for this emergency an air line was laid from the compressor house to the mouth of the slope but there was no necessity to make use of it.

On May 11th, nearly two months after the fire started the pit was opened, and the fan started, but smoke made its appearance. The pit was again closed, more water was let in, and again opened on the 23rd May, when no smoke was found. On May 23rd a small hatch, 7 inches by 9 inches, was opened in the coal shaft, and at the same time a trap-door was opened in the tunnel at the shore. The air, therefore, travelled from the trap-door at the shore across the fire district and up the coal shaft.

Parties were organized for searching, underground relief, and superintending operations on the surface. The underground party entered the pit by the travelling slope. Considerable damp was met with, but great care was taken, and no accidents happened. The temperature reached 114 degrees.

Another party which entered the pit by the tunnel at the shore was once driven back by damp, but next day succeeded in connecting with the party on the travelling slope.

On May 24th, 7.30 p.m., the fan was started exhausting, and the main shaft was uncovered. From this time the work of opening up and arranging for pumping out the pit were vigorously carried out. The water had risen to the shaft bottom, but the pump, although partly covered, was started on May 30th, 1903.

One of the greatest mine pumping propositions was now before the Dominion Coal Co. Time was of great consequence on account of the demand for coal. The total quantity of water required to be pumped amounted to approximately 516,000,000 gallons, besides what the mine made through feeders and falls amounting to 500 gallons per minute. When it was decided to flood the pit, telegraph enquiries had been sent to all pump makers for prices and sizes of pumps on hand for immediate delivery, and it was a case of taking almost anything that could be immediately shipped, and the material and machinery bought for this purpose consisted of the following pumps: 12 Knowles Duplex 14 x 18½ x 10-500 gallons; 4 Smith Vaile Duplex, 14 x 9 x 12-600 gallons; 4 Jeansville 12 x 8 x 18-600 gallons; and two Worthington, 14 x 12 x 10 Duplex, 1,000 gallons; making a total of 22 pumps of a total capacity of 12,800 gallons per minute. The pipe amounted to 27,000 feet of 8 inches, 24,000 feet of 6 inches, 900 feet of 12 inches, 900 feet of 10 inches and 26,000 feet ranging from 5 to 2½ inches.

On the two South Deeps eight pumps were worked, which discharged to the surface through four eight-inch pipes. They were arranged in sets of four on each deep, two pumps connecting to one eight-inch discharge.

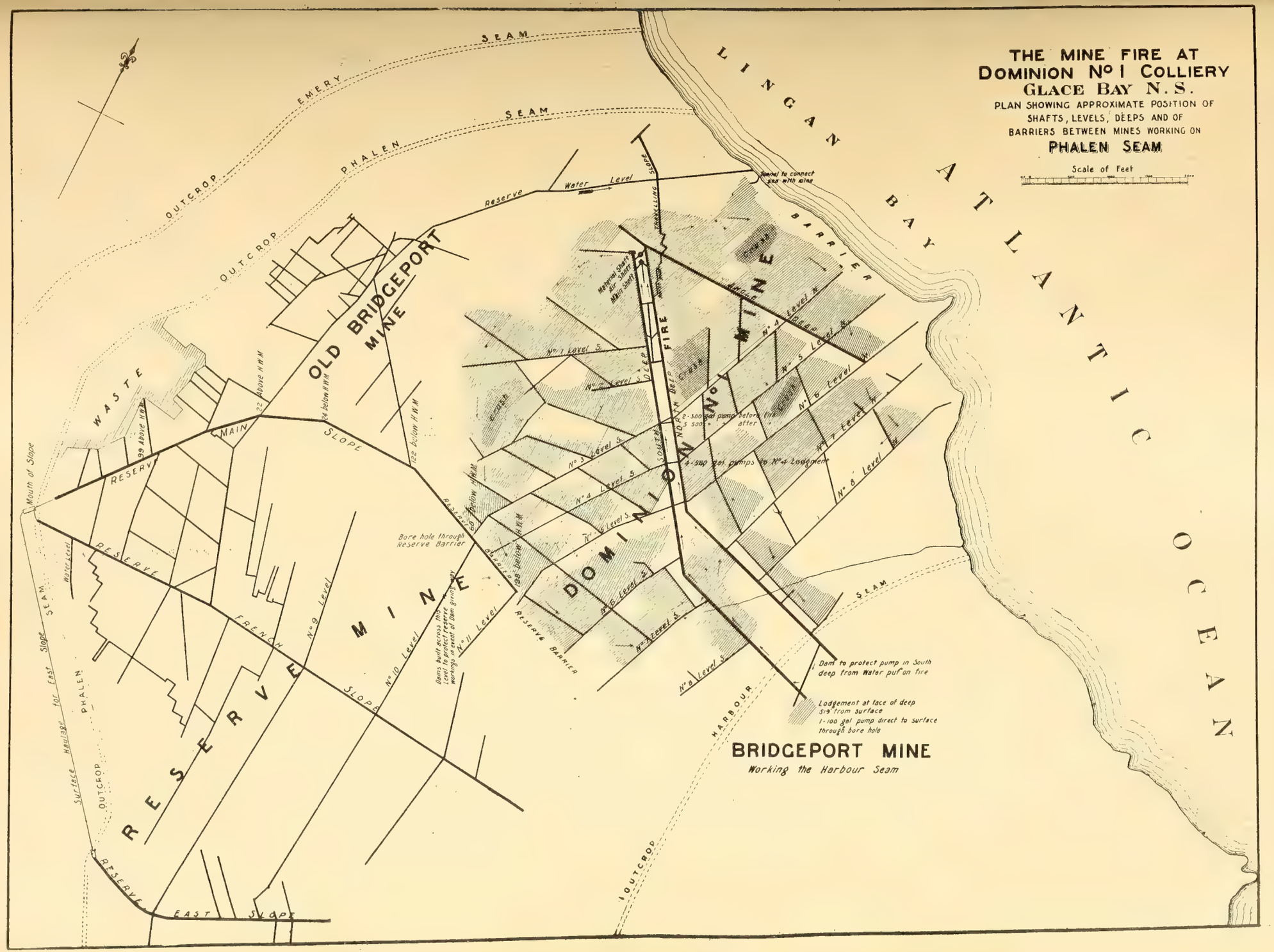
These sets were staggered and moved down the deeps whenever the suction reached a length of 350 feet. The North Deeps down to the fire were so badly fallen that pumping could not be continued in them. Four pumps were therefore carried down the Angle Deep and discharged up the shaft to the surface till No. 1 Landing was reached when discharge lines were laid along this to the tunnel opening to the sea, thus cutting off 80 feet of head. The pumps on this deep were carried along on a suction of about 450 feet until No. 4 level was reached, when they were moved over to the Centre and North Deeps, discharging to the sea through four 8-inch discharge lines.

When the water receded below the lodgment on the North Deep the lodgment was used as a second lift. Five pumps were placed at this point, and water was delivered to them by the four working down the Middle and North Deeps. The eight pumps working on the South Deeps were then pumping to the pit bottom lodgment from which four large pumps pumped to the surface through the material shaft. The pumping was of necessity at times very slow on account of the numerous falls which had taken place by the shifting of pumps and by the resumption of mining before the pit was clear of water.

On May 30, 1904, just one year after the beginning of pumping operations, the mine was completely pumped out. Besides the 516,000,000 gallons which filled the mine, the mine was making about 500 gallons per minute during this period, which amounted to approximately 276,000,000 gallons. The total number of gallons pumped was therefore 792,000,000.

The air compressors which kept these pumps in operation were worked to their full capacity. To relieve them the pumps located around the lodgment at the shaft bottom were driven by steam.

The action of the gases from the fire on the pipes, ropes and iron work around and in the coal shaft was very destructive. All the rope and pipe that had been exposed to it were so badly eaten that complete renewals were necessary.

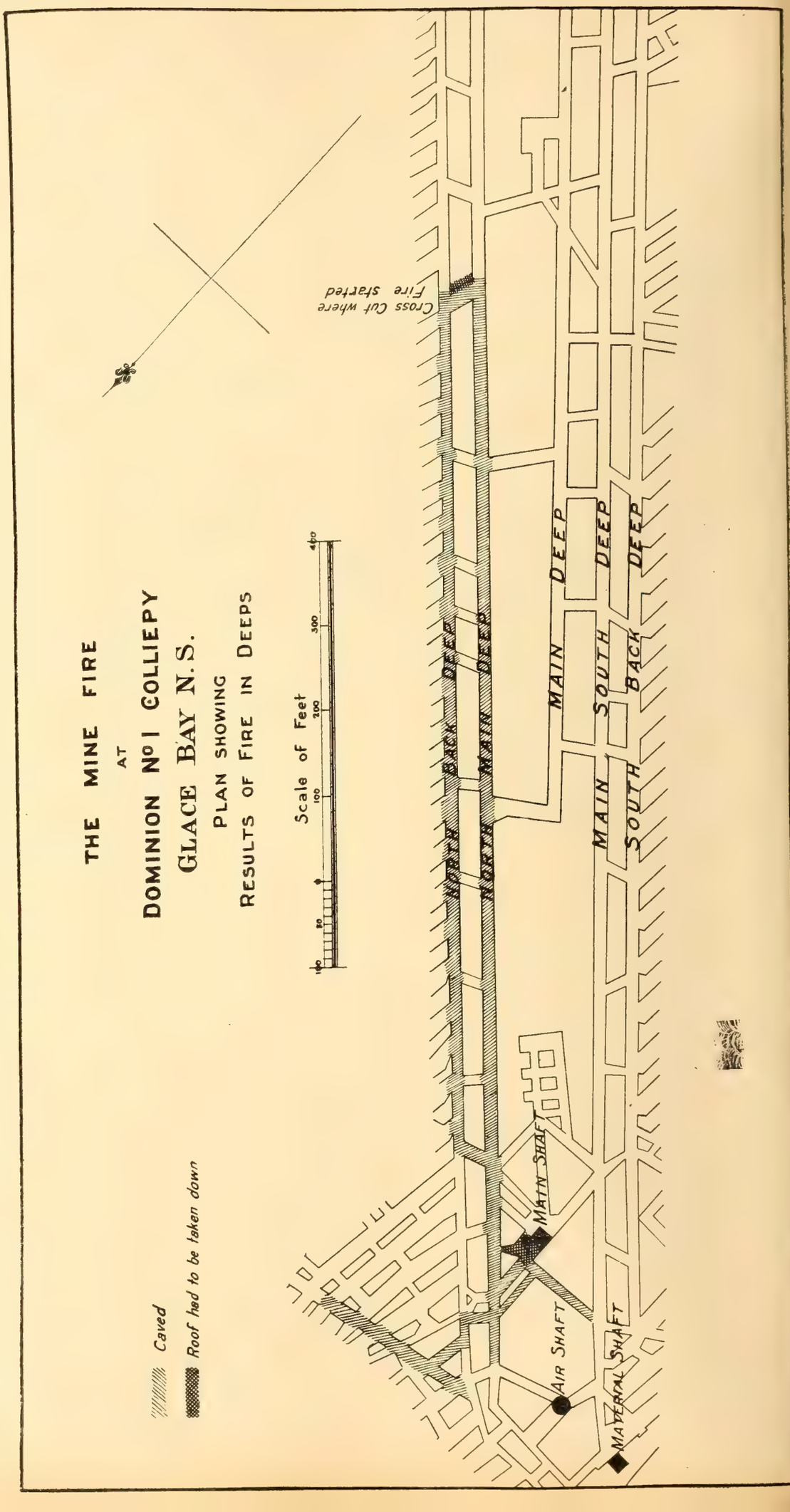

THE MINE FIRE AT
DOMINION Nº 1 COLLIERY
GLACE BAY N.S.
PLAN SHOWING APPROXIMATE POSITION OF
SHAFTS, LEVELS, DEEPS AND OF
BARRIERS BETWEEN MINES WORKING ON
PHALEN SEAM
Scale of Feet
LINGAN BAY
ATLANTIC OCEAN
SEAM
EMERY
PHALEN
OUTCROP
Reserve
Water Level
Nominal to connect sea with mine
OLD BRIDGEPORT MINE
WASTE
MAIN
SLOPE
RESERVE
Mouth of Slope
Surface Haulage for East Slope
PHALEN SEAM
Water Level
FRENCH
Nº 9 Level
Nº 10 Level
Nº 11 Level
RESERVE MINE
EAST SLOPE
Bore hole through Reserve Barrier
Dams built across mine Nº 11 Level to protect reserve workings in event of Dam giving way
RESERVE BARRIER
DOMINION Nº 1 MINE
FIRE
BARRIER
Nº 1 Level S.
Nº 2 Level S.
Nº 3 Level S.
Nº 4 Level S.
Nº 5 Level S.
Nº 6 Level S.
Nº 7 Level S.
Nº 8 Level S.
Nº 4 Level N.
Nº 5 Level N.
Nº 6 Level N.
Nº 7 Level N.
Nº 8 Level N.
2-500 gal pumps before fire
3-500 " after
4-500 gal pumps to Nº 4 Lodgement
Dam to protect pump in South deep from Water put on fire
Lodgement at face of deep
Sig from surface
1-100 gal pump direct to surface through bore hole
HARBOUR
BRIDGEPORT MINE
Working the Harbour Seam

In the fire section of the mine both deeps on the North side had fallen completely to a height in some places of 12 and 15 feet, as shown by the crossed shading in plan. In very few places was it possible to crawl over these falls. This necessitated much labour and expense in cleaning, tunneling and timbering to place the travelling road and haulage way in a fit condition for operation. Even if it had been possible to do without the use of these roads, the shale and roof coal were found to give off a certain amount of heat, on the haulage road particularly. For this reason it was considered better to clear it out than to run the risk of the fire starting again on this deep. There was no apparent reason why the temperature of this material should have been so much higher than at any other place to which there was access unless the dust, which was very fine, combined with oil dropped from the pit tub axles, made the condition more favorable for spontaneous combustion, and with the enormous weight of the roof that had fallen, pressing upon it, excluding the air current.

The stone removed from the walls amounted in round numbers to 25,000 tons, and was removed from the pit. This does not include about an equal quantity which was removed from the falls when reaching the working face, as this was stowed in the mine.

The places where these falls had taken place were newly-timbered. About 3,000 booms were put in, besides props, etc., used for lofting. In some places where the roof was very heavy props were used in the centre of the boom.

No harm was done to the shaft, but around the shaft bottom, as shown on the plan by parallel shading, the action of the heat on the roof made it necessary to bring it down to a height of two feet, which greatly improved the condition of the roads about the place.



The Mines of Ontario.

By W. E. H. Carter, B.A.Sc.*

(Concluded.)

CORUNDUM MINES.

This abrasive mineral was first discovered in Canada in 1896, in the township of Carlow, County of Hastings, Ontario, and in the two years following received particular attention in the way of exploration of the area of occurrence by Provincial and Dominion geologists, whose exhaustive reports (12) appeared shortly after. No discussion, therefore, need be here undertaken on the geologic phase of the present situation of the industry. The corundum is associated, as a constituent, with igneous rocks embracing the ordinary varieties of syenite, syenite pagmatite, nepheline syenite and anorthosite, and is always crystalline and disseminated. Where mined so far the rock as roughly sorted has contained 10 per cent. or better of corundum, which is a probable average of the various deposits now opened up. Further work in the field by private enterprise has increased the number of known corundum deposits considerably, but only two additional operators have appeared, making a total of three. The Canada Corundum Company, the pioneer, considering, after its four or five years of fairly steady experimental operation on a small scale, that an efficient process of concentration or refining of the corundum-bearing rock has been evolved, has during the past year erected a new plant of very much larger capacity, in fact, to treat about 200 tons of rock per day. This has been completed and started running in March. The method of ore extraction is entirely by quarrying. The finished article is nearly pure corundum, graded into some 15 or 20 different sizes, from No. 12 mesh to No. 200, and is sold in part to manufacturers in the United States, but principally to the Hart Corundum Company at Hamilton, and there made into wheels and various other abrasive goods. In the new refinery the process differs from that in the original plant in that coarse concentration on jigs is done away with, the whole product from the mine passing over the concentration tables, Overstroms, as fines, but closely sized for each table. The efficiency of the process depends directly on the degree of exactness with which the fines or slime pulp for any table is sized, because of the closeness of the specific gravities of the two minerals, corundum and feldspar, to be separated.

A few miles west of the above mine and works the Ontario Corundum Company has since 1902 been getting out corundum rock, sorting it as clean as possible by hand, and then shipping to the United States for complete separation. Latterly this preliminary concentration has been assisted by mechanical means in a small plant. The quarry exhibits ore of the same class and quality as at the other mines.

About the same distance to the north the third operator, the Corundum Refiners, Limited, has opened up quarries on other corundum deposits with the intention of shortly erecting another refinery in the district.

Interest in this economic mineral has increased considerably now that the abrasive market is likely to be appreciably affected by a continuous supply from these mines. Although costing more to produce than its rival, emery, the superior quality of the corundum for many abrasive uses, appears to more than compensate for the difference. Unlike emery it does not destroy the temper of the tool or other metal article ground.

GRAPHITE MINES.

The industry of mining and refining this mineral can point to but one steadily producing mine, the Black Donald, in Renfrew county, within recent years, although others have been worked from time to time to appreciably increase the output in Ontario. These others include such as the McConnell mine near Perth, and the Allenhurst, in Denbigh township, a few miles east of the Black Donald mine. The ore of the Black Donald occurs as a vein in crystalline limestone of Archean age, its width gradually increasing from 15 feet at one end to 26 feet at the other underground face 400 feet distant. Its carbon content averages about 65 per cent., composed of the amorphous and the flake or crystalline varieties in the proportions of 45 per cent. and 20 per cent. respectively of the whole vein filling. All of the amorphous running 50 per cent. or over of carbon is sorted out and shipped in the crude state to be ground up elsewhere for a foundry facing product, while the remainder down to a 10 per cent. or 15 per cent. material is refined in a mill at the mine into nine grades of flake, mixed flake and amorphous (finer), and amorphous (finest), these ranging in purity from 96 per cent. down to 54 per cent. respectively. A developed water power on the Madawaska River, with electric power transmission to the mine and works, allows of economic operation.

The Allanhurst ore is similar in character to the Black Donald, while that of the McConnel is entirely flake. Throughout these counties of Renfrew, Addington, Frontenac and Lanark are numerous other occurrences of the mineral, some of which with their small amount of development already give prospect of becoming paying mines. The deposits across the Ottawa River, in Quebec, produce only flake and crystalline graphite, which, while forming the most valuable variety for use in the manufacture of crucibles, is too expensive for foundry facings, paint, stove polish and other such purposes where extreme purity is not essential. The Ontario amorphous deposits therefore supply a large market.

MICA MINES.

Previous to the year 1896 mica was obtained in Ontario almost entirely as a by-product from the mining of apatite or phosphate, the average yearly output amounting to considerably less than 100 tons. Between then and 1898 the relative importance in these deposits of the two associated minerals became gradually reversed, owing to extraneous conditions, such as, on the one hand, the opening up of many other much larger and more cheaply workable phosphate mines in the Carolinas and Florida, and, on the other hand, the utilization on a greatly increased scale of mica, as an insulator in electrical machines and apparatus, this latter mainly the result of the invention of the more generally applicable micanite or built up mica board.

The yearly production of mica reported to the Bureau of Mines is at best only a fairly close approximation of the actual output, because of the difficulty of getting at the numerous small and unpretentious operators, such as farmers who work their little pits during spare days. In 1899, however, the figures showed a rise to 266 tons mica for the year, worth $38,000. In 1900 the output was 643 tons, worth $91,750, and in 1903 was 948 tons worth $102,205. The number of mines in operation in any one year is about 15, of which one, the

* Paper read at the Sixth Annual Meeting of the Canadian Mining Institute.

(12) Bur. Mines, Vols. VII. and VIII.; Geol. Survey of Canada, Reports.

Lacey, at Sydenham, raised in 1903 about 65 per cent. of the yearly product, with but 45 or 50 men on the pay roll. The mica in this mine occurs in places almost massive and in extraordinary large crystals. Dimensions of five feet across the face by a proportionate depth are not uncommon, while one measured nine feet across. One such crystal, three feet by five feet face by four feet thick, contains 60 cubic feet and will weigh about ten thousand pounds, at least half of which in a good crystal will form marketable mica, and at a rough average of twenty cents a pound will be worth one thousand dollars. Great skill is required in drilling and blasting out the mica in order not to seriously damage the crystals. Out of the rough mica raised from the mine only twenty-five per cent. or thereabouts reaches the market, the remaining seventy-five per cent. going to waste in the various trimming processes, where the flawed (fissure or spotted, etc.) portions are removed.

The geologic occurrence of the mica is described in a number of publications (13). The crystals lie embedded in irregular dikes of pyroxene with or without associated calcite, the pyroxene penetrating the granite or gneiss country. The mica-bearing portion of the pyroxene forms a chimney or chute most frequently, but when, as is occasionally the case, it is more veinlike, it has no great continuity and generally is definitely determinable as an elongated lenz. For this reason few of the mines have attained imposing size, being simply open pits, or extensions down of the same subsequently timbered over and worked as a large irregular shaft. The deepest mine is the Stoness, in Loughboro township, where such a shaft was sunk 425 feet, having an average cross-section of about 20 feet by 30 feet, and an incline of 25 degrees from the horizontal. The Pike Lake mine, practically the only one from which white mica or muscovite has been produced, was worked as an immense quarry three or four hundred feet in length by two-thirds this in width and about sixty feet deep, the merchantable sized mica occurring throughout a dike of pyroxene in numerous chimneys or large pockets.

Most of the mica is of the amber variety, called phlogopite, and is equal to or better than any other found in the world for the purpose of electrical insulation. The product of these mines is trimmed in Ontario, some of the larger shops also splitting for mica board, prior to shipment to the largest consumers, the General Electric Company and the Westinghouse Electric Company in the United States. A fair proportion is manufactured into the finished articles in this country, as at the Canadian General Electric Company's works and numerous smaller electrical supply concerns. At Montreal much of the scrap mica is used for making boiler covering.

The only other important mica fields are in the two Provinces of Bengal and Madras, in India, where in 1902 the production of mica was 1,095 short tons, against Canada's 1,560 tons or Ontario's 1,000 tons. In India 130 mines combined to raise the above tonnage, with the employment of 9,219 laborers, as against Ontario's 15 mines, employing 110 men. The total reported output for all countries in 1902 was 2,905 short tons, so that Ontario's contribution amounts to more than one-third.

The large mica crystals which formerly brought such fancy prices are now very little used. In fact, most of the product of the mine is cut down to the more generally applicable sizes of 1 by 3, 2 by 3 and 2 by 4 inches, for which the prices at the mine are per pound about 7 to 9, 15 to 20 and 25 to 30 cents respectively. These sizes may then be turned into micanite or mica board.

(13) Reports Bur. Mines and Geol. Sur. of Can. ; and Can. Min. Inst,. Vol. VII., "The Occurrences, Production and Uses of Mica."

OTHER MINES.

In addition to the foregoing mines there are a number of others of different minerals which deserve mention, although at the present time not a great deal more information can be supplemented to the existing accounts of the same in the recent Bureau of Mines reports and elsewhere. These consist of the mines of molybdenum, platinum, feldspar, gypsum, actinolite, talc and asbestus.

Two molybdenite deposits have been mined within the past two years, and from both ore of good quality raised. Previous to 1902, although molybdenum was known to occur in Ontario in numerous localities, particularly throughout the Archaean rocks of the eastern portion, no attempt had ever been made to test and mine the deposits. One of the important finds is near Norland, Victoria county, from which several tons of ore, unusually rich for this disseminated class of occurrence, were raised, in fact, 3¼ tons valued at $400. The writer has had concentration tests made of it by the Haultain-Stovel oil process, at Nelson, B.C., with most satisfactory results, the flakes of molybdenite down to the finest particles being separated almost completely and cleanly from the gangue. The other property which has been worked lies near Tamworth, in Sheffield township, Addington county, and from it last fall a considerable tonnage of ore was raised, of which 85 tons, valued at $1,275, were shipped to chemical manufacturers in the United States. This ore contained about two per cent. molybdenum. A certain amount of surface prospecting has progressed on some of the other occurrences, which completes the development in this vicinity.

The metal occurs as the sulphide molybdenite, in flakes of a size from the merest particle up to three and four inches across, and disseminated through a variety of igneous rocks such as gneiss, greenstones and pyroxene. Where the rock matrix weathers easily the molybdenite frequently decomposes to a yellowish oxide, which requires other means of separation than a mechanical process. Large flake molybdenite was reported recently to have been discovered in northwestern Ontario in the Lac Suel area, but there, as elsewhere in this Province, in the disseminated state. In British Columbia and a few localities in the western States it, on the other hand, occurs in massive veins up to eight inches or so in width.

Platinum has been found in appreciable and mechanically separable quantities in but one place in Ontario, namely, at the Vermilion nickel mine, in Denison township, and there as a hitherto unknown compound of this and other metals of the same group (these last in very minor proportions) with arsenic. It has been given the formula $PtAs_2$ and the name sperrylite, and is obtained together with the gold by mechanical means from the decomposed mineralized norite or gabbro forming the surface of the nickeliferous pyrrhotite ore body. By analysis it contains platinum 52.57 per cent., arsenic 40.98 per cent., oxide of tin 4.62 per cent., and the remainder in antimony, rhodium, palladium and iron. This mine was re-opened about the first of this year by the owners, the Canadian Copper Company, and we may, therefore, expect to have an appreciable quantity of platinum added to the mineral production of the Province, either as the mineral sperrylite or later by separation as pure platinum from the nickel-copper mattes from the smelters. Most, if not all, of the other pyrrhotite ores of this nickel range contain a small percentage of plati-

num, probably in this state of combination as sperrylite, which is subsequently separated with the other precious metals in the final treatment or refining of the nickel-copper mattes obtained from smelting the ores.

A year or so ago platinum was reported to have been found in some of the eruptive rocks near Wabigoon, Rainy River district, but beyond a little surface mining and analysing of samples nothing much was accomplished in the way of opening up and determining the nature of the occurrence as to whether or not it is of commercial value.

The mining or rather quarrying of feldspar has extended to a number of other properties in the immediate vicinity of the pioneer mine, the Richardson, in Bedford township, north of Kingston. The newer workings give promise of also developing into large producers, the feldspar at most of them equalling that of the Richardson. Some are raising a white feldspar, but it appears to be quite suitable for the same purposes as the pink variety (microcline) in the manufacture of pottery and for glazing tiles and other enamelled ware. The production of this mineral has increased rapidly since it was first mined in the winter of 1900-1901, the output for 1903 from about five properties amounting to 15,296 tons worth $20,046. This so far has all been shipped to pottery works in the United States.

The methods of mining are of the simplest, the rock being quarried in great masses onto the floor of the pits, there cobbed and sorted clean, and then raised by derrick either by horse or steam power. It is immediately hauled to the railway for shipment. Great care must be exercised after the feldspar leaves the pit that it be not contaminated with any foreign material, since this causes discoloration when it is fused and spoils it for pottery making.

Gypsum mining in Ontario is confined to the banks of the Grand River, near Paris, where the mineral occurs (14), filling irregular cracks in beds of shale of the Onondaga formation and constituting about fifteen per cent. of the material as mined. It is there manufactured into a fertilizer and into alabastine, " Paristone," and other wall preparations.

Vaster beds than these have been discovered (15) in the Devonian limestone of northern Ontario, near James Bay, outcropping along the Moose or Missanabie, the Abitibi, the French and other rivers, and appearing to indicate that one continuous bed or belt of the mineral passes from one to the other of all these showings. The gypsum occurs in them massive and practically clean of limestone over large areas. The lack, however, of any means of shipment to or from this distant locality has, of course, prohibited all attempt at mining. The Temiscaming & Northern Ontario Railway is rapidly creeping northwards, where in its ultimate extension to a seaport on James Bay it will pass over the deposits and be probably the first means of converting them into a merchantable mineral.

The actinolite and talc mines of Hastings county have worked along in a small way, but occasion no particular additional description in this paper. The James actinolite deposit at Actinolite has been producing and the mill grinding to a finished article for roofing material, etc., for the past twenty years or more.

The Henderson talc mine contains a mineral of excellent quality and purity, suitable for the most delicate toilet powders, etc. On account of its foliated structure it can, however, only be used for crushing to powders and is, therefore, excluded from the market for such purposes as gas and acetylene burner tips which require the hard, massive variety.

In Hastings county, near Actinolite, a mine was opened last year for the production of short fibre asbestos, the formation in which the mineral occurs being the same as that of the actinolite mines, namely a blackish-green hornblende or amphibolite rock, often schistose in structure. A mill was erected for the separation of the asbestos fibre for use in the manufacture, from the best of it, of boiler covering, and from the remainder wall plaster. It is not as yet an extensive industry.

(14) Bur. Mines, Vol. XII., p. 147.

(15) Bur. Mines, Vol. XIII.

PERSONALS.

Major W. F. Van Buskirk, who died recently at Stratford, Ont., was formerly the City Engineer of Rossland, B.C.

Mr. Frank B. Smith, Inspector of Mines for the North-West Territories, has been paying a visit to Vancouver and Victoria.

Mr. Hugh Rose, lately at Rossland, B.C., is superintendent at the Tecoletes mine, in the Santa Barbara district, Mexico.

Mr. Edmund B. Kirby is on his way to Denver, and will proceed shortly to Goldfield, Nevada.

Mr. David Wilson, late Underground Superintendent of the C.N.P.C. Company's Carbonado Colliery, has been appointed to a position in the management of the Bankhead Collieries at Banff.

The firm of Pellew-Harvey, Bryant & Gilman, of Vancouver, have dissolved partnership. Mr. Bryant will carry on the assaying ore testing business under the name of C. M. Bryant & Co.; Mr. Gilman is to engage in practice as a mining engineer.

Mr. J. Obalski, Inspector of Mines for the Province of Quebec, has been appointed to take charge of the Dominion Exhibit which will be made at the Liege Exhibition next summer. This exhibition opens in May and closes in November. It is unusual in being held in the midst of metallurgical industries, and Mr. Obalski's appointment in charge of the Dominion's exhibit is a strong testimony to his ability.

Mr. Chas. A. Bramble, for the last four or five years in charge of the Advertising Department of the C.P.R., has resigned his position. Mr. Bramble is well known for his writings on outdoor sports and mountain scenery, and his knowledge of the West made his services particularly valuable to the Railway. It is understood that Mr. Bramble intends to devote himself to business on his own account in the future. He is succeeded by Mr. W. T. Robson, the former New York representative of the McLean Publishing Co.

Mr. John P. Cosgro, formerly mechanical superintendent of the War Eagle and Centre Star Mines at Rossland, has accepted an appointment with the Allis-Chalmers Co. of Chicago, which puts him in charge of all hoisting engine business. Mr. Cosgro's experience in Rossland and previous connection with the Anaconda Mining Company specially fit him for his new position.

The retirement of Mr. E. B. Kirby last month from the general management of the Centre Star and War Eagle Mines was made the occasion for several presentations and addresses from both mine employees and citizens of Rossland. At an informal meeting presided over by the Mayor of Rossland, Mr. Kirby was presented with a solid silver service and the good wishes of his fellow-members of the Rossland Board of Trade. In replying to the presentation, Mr. Kirby stated his belief that Rossland would be a great and lasting centre of mining activity, and that the big mines were now on a profit-earning basis.

Although resigning from the management of the companies named, Mr. Kirby has not entirely severed his connection with British Columbia, his professional connections requiring him to visit the province at intervals.

Dr. H. M. Ami, of the Geological Survey of Canada, was in Montreal during the first week of the month attending the sessions of the Canadian Mining Institute. Dr. Ami has been quoted frequently of late in eastern newspapers in consequence of his remarks concerning the probable existence of glacial drift carrying diamonds in the James Bay and Hudson Bay basins. The drift material south of the Great Lakes has already provided eight diamonds, but as to whether they will be found in valuable quantity, the Doctor thinks, remains, as yet, an open question.

In these days of labour strikes it is pleasing to note the cordial relations existing in some industrial enterprises in Canada. At a meeting of nearly 300 of the workmen employed by the Canadian Smelting Works at Trail last month, held to consider the proposed eight hour law introduced into the legislature of British Columbia, the following resolution was adopted by a large majority :—"Whereas, a bill has been introduced in the provincial legislature, providing for a maximum eight hours in smelters, which bill, if passed, will, in our opinion, have the effect of disturbing the existing pleasant relations between smelter employees here and the smelter management, and result either in a corresponding reduction in wages, or else in large labour disputes, and the closing of mines and smelters for an indefinite period, resulting in great financial loss to ourselves and the community generally; therefore, be it resolved, that we, the business men of Trail and employees of the Canadian Smelting Works, in mass meeting assembled, do petition the Government to avoid any legislation which may have the effect of bringing on these conditions."

BOOK NOTICES.

A Hand-Book of Commercial Law, by Mr. William Patterson, of the Montreal Bar, published by Mr. C. Theoret, 11 St. James Street, Montreal, has come to our table this month, and is a most valuable publication for people having business in the Province of Quebec. The common, or civil, law of Quebec is a modification of the Roman Justinian law, modified through French experience, and subsequently remodified to adapt it to the necessities of the 18th and 19th centuries. To people experienced only in the law and practice of the English code, it presents many points for admiration, and several for perplexity, and the Review is free to say that this little Hand-Book gives a most admirable outline of the commercial laws in force in the Province of Quebec. It is valuable to all mining engineers, and mine managers who have to do with contracts made in that Province.

The essential principles governing commercial transactions in Quebec are clearly and simply put, so that the book is most valuable as a handy reference to lie on one's table throughout business hours. We can commend the publication very heartily to all our readers who have commercial transactions in the Province of Quebec.

Mining Share Market.

Lack of interest continues evident in mining stocks generally, the only Canadian companies in which the public is now disposed to invest being Granby Smelter and Montreal & Boston, and this demand is entirely from Boston and New York. Industrials are more active, and speculation in them is broadening out; all show considerable advances over last month, except Nova Scotia Steel, which is adversely affected by the rumor that the dividend will be passed.

The following list shows the quotations for the week ending Monday, March 13, as supplied to the Review by **Robert Meredith & Co., 57 St. Francois Xavier Street, Montreal:—**

Par value of shares.		Asked.	Bid.
.10	Canadian Gold Fields Syndicate	.05	.04
5.00	Cariboo Hydraulic	—	—
1.00	Centre Star	.23	.21
1.00	Deer Trail Consolidated	.02	—
1.00	Giant	.03½	.01
10.00	Granby Consolidated	.06¼	.06
10.00	Montreal and Boston	.01 1-16	.01
1.00	North Star	.02	—
1.00	Payne	.02	.01
1.00	Rambler Cariboo	.15	.12
1.00	Republic	.03½	—
1.00	St. Eugene	.45	.40
1.00	War Eagle	.13	.11
1.00	White Bear	.04	—
100.00	Nova Scotia Steel (common)	62⅝	.62
100.00	Ditto ditto (preferred)	—	—
100.00	Dominion Coal (common)	.73¼	.73
100.00	Ditto ditto (preferred)	—	—
100.00	Dominion Iron and Steel (common)	.23¼	.23
100.00	Ditto ditto ditto (preferred)	.74	.73½
——	Ditto ditto ditto (bonds)	.84½	.84¼

INDUSTRIAL NOTES.

The Dominion Coal Company is increasing its lighting plant at International Pier, and will install two sixty power Robb-Mumford boilers and a seventy-five horse power Robb-Armstrong engine.

The Cape Breton Electric Company has ordered a 150 horse power engine from the Robb Engineering Company, to increase the capacity of its North Sydney power station.

The annual general meeting of the shareholders of the Dominion Wire Rope Co., Ltd., was held at the head offices of the Company in Montreal, on the 16th February. The following officers were elected for the ensuing year: President, F. W. Fairman; Vice-President, and Managing Director, F. H. Hopkins; Secretary and Treasurer, J. J. Rosevear.

The Robb Engineering Company, Ltd., of Amherst, N.S., has established a branch works at South Framingham, Mass., where it will manufacture its special Mumford boiler and the Robb-Armstrong engine for United States customers. The plant taken over at South Framginham covers nine acres, and is well equipped with machinery, tools, etc., etc.

The Fairbanks Company, known in the United States as the Fairbanks-Morse Company, has been converted into a corporation known as the Canadian Fairbanks Co., Ltd., and will have its own plant in Montreal for the manufacture of the standard machinery of the Fairbanks Company. The purchase by the Canadian Fairbanks Co. Ltd., includes all the selling agencies of the Fairbanks Co. throughout Canada.

The Allis-Chalmers-Bullock, Ltd., of Montreal, have appointed Mr. Wm. M. Moran, as their general sales agent for the Maritime Provinces, with his office at Halifax. Mr. Moran graduated from Washington University with the degree of mechanical engineer, and has been engaged in electrical and railway work for the last nfteen years. He was formerly with the Brush Electric Company, the Edison Electric Company, and Townsend & Reid of Chicago, which firm is one of the largest railway contracting firms in the United States.

There has been considerable renewal of activity in mining operations in Central Ontario recently, and many of the companies have made large increases in their plants. The Kingston Felspar Mining Co., at Bedford, purchased from Allis-Chalmers-Bullock, Limited, Montreal, a hoisting plant, including a 30 h.p. double cylinder Lidgerwood engine; James Richardson & Sons, zinc miners, Mountain Grove, purchased an Ingersoll-Sergeant air compressing plant and the Madoc Mining Co., at Tweed, purchased a complete mining plant, consisting of a horizontal return tubular boiler, Ingersoll-Sergeant air compressor, Lidgerwood hoisting engine, etc., both from Allis-Chalmers-Bullock, Limited, Montreal.

The Manufacturers' Advertising Bureau, 126 Liberty street, N. Y. City, has found the past year to be marked by the same steady growth of business which has charactertized its history for many years.

There is a demand for a Bureau of this kind which offers a real help to busy manufacturers in taking charge of the advertising end of their business, and giving to it the care and attention necessary to make the investment a profitable and satisfactory one.

Mr. Benj. R. Western, proprietor, established the Manufacturers' Advertising Bureau in 1879.

The Bureau is regarded as headquarters for reliable information regarding trade journal advertising.

The Westinghouse Companies have taken an order for the equipment of a power house to operate gold dredgers on the Alaskan rivers.

The Canadian Klondike Mining Company (Detroit), has given the order to install a 400 kilowatt turbo-generator in the power house, to be driven by a 600 horse power Westinghouse-Parsons steam turbine. The dredges are to be built by the Marion Steam Shovel Company, of Marion, Ohio, the machinery of which will be driven by induction motors, aggregating a total of about 500 horse power, and varying in size from 7 1-2 to 100 horse power.

The power house will be at Dawson City, and the dredges will operate on the Yukon River and its tributaries. Lines for transmitting power will be strung from the station to the boats, wherever they may be working.

MINING NOTES.

NEWFOUNDLAND.

Captain John Stewart has had ten men at work during the winter on a property at Mings Bight, Nfld., and the quartz mined has shown good gold values, a portion of which is free milling, and the balance is contained in the sulphurets which are found in the quartz. The property is understood to be owned by a small syndicate, which claims to have received a small bar of gold as the result of the winter operations.

NEW BRUNSWICK.

The Electrical Manganese Co., officered by Mr. B. E. Kingman, of New York, and Mr. Frederick Sayles, of Providence, R.I., are developing a large electric power plant near Campbellton, N.B. It is the intention of the Corporation to manufacture ferro-manganese, to generate electricity for the operation of the pulp and saw mills in the vicinity, and to transmit electric power to the St. John River Valley to be used for lighting and manufacturing. The Corporation has a large capital and declares its intention of spending between three and four millions of dollars in the development of its schemes. Work will be begun early this present summer.

NOVA SCOTIA.

The February shipments from the collieries of the Cumberland Railway and Coal Co. amounted to 18,326 tons.

The Cape Breton Copper Co., Ltd., has sold at public auction the property known as the Coxheath Copper Mines in Cape Breton County.

The Dominion Coal Company shipped from Louisburg during February, 61,000 tons, or nearly one-half of the total shipments made during the month.

The Dominion Coal Co. are planning to mine 3,500,000 tons during the year 1905; of this amount 1,250,000 tons have already been placed in the St. Lawrence market.

A sudden run in the large stock pile of iron ore at Sydney furnaces buried three workmen on the 3rd of March, but fortunately none of them were seriously injured. The accident was caused by a cave-in, the unfrozen ore below the frozen surface having been dug out.

On appeal from the finding of the trial judge, the Lakeview gold mining property at Waverley, Halifax County, has been awarded to A. A. Hayward, et al. This decision is understood to be final.

The Dominion Iron and Steel Co. expect to be rolling rails in June. The recent heavy storms in Nova Scotia have delayed construction work, the materials needed being stalled in snow drifts along the various lines of railway.

The old Dufferin Gold Mine is reported likely to commence work again; contracts for fuel have been let and machinery is now being overhauled preparatory to starting operations. The name of the new corporation has not been disclosed.

One hundred and fifty mining acres at Clam Harbor, Halifax County, have been purchased by some capitalists from the State of Maine, who will erect a small stamp mill and operate the mine during the coming summer. The corporation is a private one.

The well known Joggins Mines, the property of the Canada Coal & Railway Co., was sold at sheriff's sale this month on behalf of the bondholders, for the sum of $50,500. The timber land, covering something like 1,900 acres, was sold for $550. The purchaser was Mr. Stuart Jenckes, and it is believed that Mr. Jencks is simply acting on behalf of a syndicate which is prepared to undertake the reconstruction and re-financing of the property.

The Nova Scotia Mexican Mining Co., owning property at Goldenville, is again in trouble, and attachments for $1,112 have been issued against it by Geo. W. Stuart, for moneys advanced to the company. The Goldenville property of this company is an extremely valuable one, but the property has suffered for the last ten years through deficiency of funds to work it, and through the most ill-advised business management. It is to be hoped that, sooner or later, the property will be developed in a manner which its holdings justify.

The Cape Breton Coal, Iron & Railway Company have appointed Mr. P. F. Thomas, of London, England, as resident manager for the corporation. The Company is now using three mining machines, and will add more in the spring; two slopes have been sunk, and work on the third is progressing rapidly. It is proposed to operate seven slopes when the mine has been put in full running order. The railway from Broughton will connect with the Sydney and Lewisburg Railway at a distance of about two miles from the main land.

The Dominion Coal Co. is making important improvements to its shipping piers. The Canadian General Electric Co. has been given a contract to supply a power house and apparatus at the piers for lighting the same and furnishing power for winches, etc. The loading chutes, hitherto operated hand winches, will hereafter be worked by Denton hoists, reducing the time from 20 minutes per chute handled to about one minute. The improvements projected will appreciably reduce costs as well as save much time.

Some well known Halifax men have incorporated under the Nova Scotia Joint Stock Company's Act a corporation to be known as The Shipbuilding and Investment Company. The corporation has secured a property on the Dartmouth side of Halifax Harbor having a water frontage of 1,000 feet and a good depth, and including nearly 50 acres of ground. The site has deep water along its frontage, and has an admirable location. The directors of the company are Mr. Geo. S. Campbell, Mr. Geo. Stairs, Mr. John Longard, Mr. B. F. Pearson, and Mr. J. A. Johnson, with Mr. Hunter, of Swan & Hunter, Newcastle-on-Tyne. In this connection it may be noted that an English paper advises the Dominion Government has promised a bounty of $6 a ton on steel ships built in Canada, but Ottawa refuses to confirm this report.

The St. Lawrence Coal Co.'s property is situated on the Little Bras d'Or, four miles from North Sydney, and adjoining the property of the Nova Scotia Steel and Coal Co. The company believes it has a total available tonnage of 20 millions. The colliery is to be opened for a capacity of 500 to 1,000 tons a day and will, for this purpose, utilize a slope on the Collins seam and extending to the southern limits of the area. It is proposed to run levels on this seam and raise the coal through the slope for the market. The company hopes to be able to put coal from the Collins seam on the market this season.

ONTARIO.

The James Bay Railway is to start at Copper Cliff and run northerly; survey parties are already in the field.

The second clean-up of the mill on the Steel Mine at Sturgeon Lake is reported to have been $3,500.

English capital has been enlisted in the support of several mineral properties in Hutton Township and the Temagami district.

Messrs. J. A. Jacobs and Milton L. Hersey, of Montreal, have been examining some cobalt properties near Haileybury.

It is reported (on the authority of Mr. F. S. Clergue), that the Gertrude and Elsie mines will be re-opened about April 1st.

During February the Williams Mine shipped to the Algoma Steel Works iron ore of Bessemer quality at the rate of 35 tons a day.

The first test run of the five-stamp mill on the Shakespere property amounted to $2,826, giving a value of $23.65 to each ton milled.

The C.P.R. will transport from Liverpool to Sault Ste. Marie the 10,000 tons of spiegel iron purchased in England for the Algoma Steel Company.

The output of the new smelter at Copper Cliff is expected to be larger this month than it has ever been; all departments have been working most satisfactorily.

The Temiscamingue and Northern Railway, owned and operated by the Ontario Government, is already being operated at a profit. It is reported that the net earnings during February averaged $500 per week.

The International Nickel Company will drive their blowing engines by electric motors. Three of these, of 500 horse power each, have been ordered from the Allis-Chalmers-Bullock Company. The power is to come from the High Falls generators.

Morrisburg, Ontario, is to have a steel plate and iron works which will be financed by an American company. The mover in the matter is a Mr. Wm. J. Allison, of New York City, who has been an employee and associate of the Vanderbilts for many years.

The operations at the Big Master mine at Gold Rock have been delayed through the financial embarrassment of the company and the legal tribulations of Mr. Meyers, but recent advices say that funds have been secured and that active operations may be resumed in April.

The Lake Superior Company proposes to complete the Algoma Central Railway this year. One hundred and twenty-five miles of the road are already complete in every respect, and another one hundred miles is graded and ready for track laying; there remain twenty-five miles to be graded and ironed.

The rail mill of the Lake Superior Corporation at Sault Ste. Marie, has made a new record by blowing 93 heats in 12 hours, or a total of 362 tons in half a day. This is at the rate of 742 tons of steel rails in 24 hours, and when it is remembered that the capacity of the plant was figured for 500 tons a day, this increase of 50 per cent. over the nominal capacity is remarkable.

There appear to be good chances for a revival of operations in the Lake of the Woods section. The Black Eagle will resume operations under the personal direction of General Sir Henry Wilkinson at once. Reports says that funds for the re-opening of the Bully Boy are available, and that the Olympia mine will start its mill this spring. The work at the Sultana continues to yield profitable ore. The Mikado, however, is advertised for sale by the branch of the Imperial Bank at Rat Portage.

The property of the Mikado Gold Mines in the Lake of the Woods District has been advertised for sale by tender at the instance of the Imperial Bank of Canada. The property includes about 300 acres on which three gold veins have been proved. The total production of this property during the long time that it has been worked has been about $500,000 in gold, but no earned dividend was ever made. From the advertising made by the company it is evident that the present corporation will consider propositions looking to a tender of cash and shares in a company to succeed the present one.

The Atikokan Iron Company has been organized with a capital of $1,000,000, for the purpose of mining iron ore, and manufacturing iron and steel at Port Arthur, Ontario. This company has been fathered and organized by Messrs. McKenzie and Mann, of the Canadian Northern Railway. The town of Port Arthur has become interested in the company by furnishing a site of 40 acres for the plant. The company proposes to erect a 100 ton furnace this season. It will probably be supplemented by a secondary corporation to be known as the Canadian Coal and Ore Dock Co., which will construct fuel and ore docks of a capacity of 200,000 tons of coal and 100,000 tons of ore. The proposed capital of this supplementary company will be $500,000.

In the suit of Barron vs. Meyers, Judge Tappin has given judgment in favor of Barron and against Meyers. This suit was taken in connection with the well known properties which have been included in the Big Master Mining Co. and the Interstate Consolidated Co. Mr. Meyers has also been arrested in connection with the same properties by plea of another plaintiff called Bollenstein, who made a note in favor of Meyers, receiving therefor 20,000 shares of Jubilee mine stock and 2,000 shares of Big Master stock. M. A. Meyers will be remembered as the promoter from Warren, Pa., who first came into prominence in connection with transactions relating to the Port Arthur silver mines, and who afterwards engaged in the flotation of gold properties in the Manitou and Rat Portage districts. His methods have not met with the approval of the Courts.

BRITISH COLUMBIA.

The Payne mill has been started up by the lessees on ore taken from No. 8 tunnel.

The Mohican silver-lead mine on Gainer Creek, Lardeau District, is driving a long cross-cut to reach a large ore body shown on the surface.

The Eva Mill, Camborne District, is steadily crushing quartz from the Eva Mine, since the completion of the tramway from the upper levels to the ore bins at the head terminal of the main tramway.

The shipments of zinc ore from Kaslo during the week ending the 5th of March totalled 560 tons, while the shipments of silver-lead ore sent out were only 75 tons.

The Copper King property, on the west coast of Texada Island, announces that it has struck a vein of solid bornite four feet in thickness at a depth of 30 feet. No further particulars are given.

The Le Roi experimental concentrator is expected to be in operation by the first of May, and will have a capacity of 10 tons per diem. The total shipments from Rossland District to the 5th of March amounted to 60,936 tons.

Mr. M. M. Johnson of Salt Lake City, has been making an examination of the Montreal and Boston mining properties for a New York lawyer, Mr. Samuel Untermeyer, on behalf of the well known mining and metallurgical firm of the Guggenheims.

The strike of the miners of the International Coal & Coke Co. at Coleman, is still on, and it is reported that the miners are simply using this strike as a feeler to find out the strength of the different coal corporations before extending the strike to other coal companies in the Crow's Nest field.

The Empress group of claims on Howe Sound, in which Mr. O. Furry has a 50 per cent. interest, Mr. G. H. Robinson a 35 per cent. interest, and the Boscowitz Estate a 15 per cent. interest, is understood to have been optioned, as to a half interest, to a New York gentleman, for the sum of $75,000.

The Executive of the British Columbia Mining Association held a meeting at the Driard Hotel, Victoria, on the 20th of February, and made arrangements and a programme for the annual meeting of the Association, which is to be held this year in Vancouver during the last week of July.

It is reported from Nelson that the Bank of Montreal is again in negotiation with Americans for the sale or lease of the Bluebell Mine and the Pilot Bay smelter. The Bank, while admitting that inquiries have been made, says that nothing definite has been done.

Promising copper deposits have been found in the Highland Valley district, some five miles from Ashcroft Station, on the C.P.R. The ore is peacock copper on the surface, and the work done to obtain Crown grants has shown a large quantity of merchantable ore. The claims are owned by Messrs. Curtis, Sword, Knight and Hoskins.

The assets of the Winnipeg Mines, Ltd., were sold by the Judge of the County Court at Grand Forks, so as to satisfy labor liens against the property. The property was bid in by Mr. W. T. Hunter for the sum of $2,500. As the court expenses amounted to about $160, there will be $2,340 left to satisfy an aggregate of $3,400 in liens.

The furnace of the Sullivan Mining Company at Maryville, East Kootenay, is ready to blow in, and the second furnace is supposed to be ready on the 15th of March. This plant, it may be remembered, is equipped with the new Heberlein converter, which has been experimentally tried by the American Smelting and Refining Company at its Pueblo plant.

The first week in March opened with the blowing in of the sixth furnace of the Granby Smelter, and all three of the smelters in the Boundary Country are now in full operation. This makes a total of 10 blast furnaces in operation on the 4th of March. At the present time the tonnage of the three smelting plants amounts to over 20,000 per week.

The Arlington Mine, at Erie, received for the shipments made in January to the Hall Mining & Smelting Co., at Nelson, a gross value of 404,73 ozs. of gold, 771 ozs. of silver, and 8,372 lbs. of lead, the approximate value of which was $8,800. The amount of ore shipped was 129.4 tons, giving an average value of nearly $67 per ton.

From items coming to our notice from Prince Albert, N.W.T., dredging is again to be attempted upon the Saskatchewan River. The Saskatchewan Mining and Development Co. are putting in a large dredge at a cost of $60,000. It will be placed upon the river in the Spring, and another attempt will be made to dredge the sands of the Basin for the gold and platinum contents which they are known to contain.

The French Creek Mining Company, on French Creek, in the Big Bend District, Revelstoke Division, has been acquired by an Indiana outfit, which will repair the headgates, flumes and ditches, and endeavor to get to work hydraulicing at an early date in the Spring. Mr. E. A. Bradley is Superintendent. The richness of the French Creek slope of the hill has been known for many years, but intelligent management has not heretofore been employed.

The St. Eugene Consolidated Mining Co., Ltd., has declared another dividend of two per cent., making a second quarterly dividend of this amount. The two per cent. dividend means the distribution of $70,000 to the shareholders, which may be considered a very satisfactory return on the investment. The mine is now producing about 2,500 tons of concentrates each month, which are being shipped to the smelters at Trail and Nelson.

The preliminary announcement by the Provincial Mineralogist of the approximate values of the mineral output of British Columbia for 1904 shows that in spite of rumors of business inactivity in that province, the growth of the mining industry is steady, and has substantially progressed since 1903; the largest increase is that in coal ($1,500,000), lead ($750,000), and coke ($534,000). Out of a total gain of $3,600,000, more than $2,000,000 of that sum was due to increased shipments of coal and coke.

The Executive of the British Columbia Mining Association has passed a resolution asking the Provincial Government to have its assistance in the matter of investigating the taxation of mines, and requesting that the managers, or those operating mines in the province, be asked to furnish information respecting the number of tons shipped during 1904; the total revenue from the sale of products, pay-roll at mine, pay-roll at mill, pay-roll at smelter, supplies at mine, supplies at mill, supplies at smelter, official and general expenses, transportation costs to mill, to shipping points, or to smelter.

The B.C. Bureau of Information has issued in pamphlet form the report of Mr. J. H. Gray, civil engineer, on the Bulkley Valley country. He reports that in the valley of the Telqua River, (nearly 60 miles from Hazelton, several seams of a good quality of bituminous coal have been proved, and reports that some 75 square miles have been applied for by coal mining or development companies. Concerning the copper-gold claims reported in that section, Mr. Gray admits that, until transportation facilities are provided, no development can be expected. He further reports that road-making and communications are somewhat difficult.

The Hall Mining & Smelting Co. Ltd., has installed a new roasting furnace at Nelson which is the invention of an Australian, Mr. T. D. Merton, by name. This furnace has been used for roasting gold ores in Australia, preliminary to treatment by chlorination and cyanide, and it has also been adopted in some Australian smelting works. The furnace occupies a floor space of 9 feet by 35 feet; it has three decks or floors within the body of the furnace and one exterior half. Its advantages, it is claimed, are that the mechanism of the rabbling is of such a character as to turn over every particle of ore in each revolution. The reports from Queensland smelting works are very satisfactory.

Mr. F. H. Sherman, President of District 18 of the United Mine Workers of America, in a communication to the Nelson News, under date of March 1st, points out that, in the year 1903, the fatalities in the Crow's Nest Pass field were doubly those of the competitive states of Washington and Montana, and nearly three times as great as in the States of Pennsylvania, West Virginia, and Illinois. Mr. Sherman makes this statement his reason, or his excuse, for the statement that the United Mine Workers are endeavoring to keep unskilled labor out of the mines, and to increase the quality of the men whom it permits in mines. Incidentally, the statement is a claim for higher wages.

YUKON.

There are many good sized dumps on Hunker in the neighborhood of Hester Creek; from 45 to 60 below are the largest dumps on the creek.

During February operations on Hunker Creek were much hindered by an unusual flow of underground water, which is now reported to have slackened.

Glacier Creek has hitherto had only a summer post detachment of N.W.M. police, but beginning March 1st, a permanent patrol of police will be located there.

Big Gold Creek, a tributary of Sixty-mile River in the Glacier District, reports the finding of coarse gold and gravel worth 75c to the pan. The discoverers are Wm. Miller and Wm. Schofield.

Five hundred pounds of clean bornite were lately sent in to the Government Assay Office at Dawson from Lund and Lloyd's claims on White River. Assays of small samples have shown high values in gold.

It is reported that the property of the Canadian Klondike Placer Mining Co., which is located about 25 miles from Dawson, has made a strike of rich gravel. It is said that pans have shown $100 a pan.

This winter there are 199 boilers at work on Dominion, Granville, Sulphur, and Gold Run Creeks. Their aggregate horse power amounts to 3,575, and the total horse power of the engines on the same creeks amounts to 796, leaving 2,779 h.p. as the amount available for thawing purposes.

The Yukon World is authority for the statement that Mr. A. J. Beaudette, Mining Engineer to the Territory, has discovered, on No. 8 Dominion Creek, the head of a huge mammoth (Mastodon giganteus). The rest of the mammoth is being carefully uncovered in the hope of obtaining a complete skeleton.

Yukon advices concerning the new Tanana district are not favorable. There is practically no gold dust in circulation, only legal tender. This report says that only 20 to 30 claims are working this winter, 15 on Cleary Creek, 5 on Fairbanks, and 3 on Pedro Creek. A large number of claims are being prospected, but are not producing the yellow metal. Out of over 5,000 men centering at Fairbanks, less than 1,000 have steady employment.

Reliable reports from Duncan Creek, Stewart River, indicate that the deep gravels of that district may occasion a production to rival the palmy days of Bonanza and El Dorado. No shaft has yet reached bedrock except on Hiatt Creek where the average depth to bottom is not over 20 feet. The deepest shaft on Duncan in February was 139 feet with no sign of bedrock. The water is very heavy and many shafts have been lost through flooding.

From reliable sources it is announced that coal of good quality will be plentiful in the Yukon during the present year. The Alaska Coal & Coke Co. have opened a seam at Royle's Landing at the mouth of Washington Creek, 40 miles below Eagle on the Yukon, This seam is of a good coking quality and is from 5 to 15 feet in thickness. The outcrop can be traced for 3 1-2 miles, and the seam dips sharply at an angle of about 45 deg.

The White Pass and Yukon Railway have given a contract for 5,000 tons to Capt. Miller, who is working the coal at Five Finger. All the White Pass boats are having their grates changed from wood to coal burners.

At Forty Mile the Williams Co. have built a tramway (some twelve miles in length) from the mine to the bunkers, and are prepared to ship steadily when the river opens. The new shaft has now ten feet of clean coal opened. Besides these three shipping properties there is the Ames Mine, which is now reported to be free from litigation and which expects to ship coal before the close of the season.

With these collieries open, two above and two below Dawson, the days of wood at $10 per cord, will come to a speedy end.

COAL NOTES.

NOVA SCOTIA.

In spite of the coal duty the Dominion Coal Co. is still disposing of from 700,000 to 800,000 tons annually in New England.

The annual meeting of the Intercolonial Coal Mining Co. was held in Montreal on the first day of March, when the report of the manager was submitted. The total output of coal and coke for the year ending December 31st, 1904, amounted to 269,689 tons. The old Board of Directors was elected, with Mr. Jas. Cleghorn as President, Mr. Chas. Fergie as Vice-President and General Manager, and Mr. D. Forbes Angus as Secretary and Treasurer.

The Nova Scotia Steel & Coal Co. attempted to hold a meeting in Montreal on the 2nd of March, but experienced difficulty in obtaining all the directors, owing to the recent heavy snowstorms which had occurred in Nova Scotia, and which had delayed all passenger trains and had thrown all shipments out of gear. It is understood that the meeting was not unanimous as to the declaration of a dividend on the common shares, and nothing was given out for publication.

The Dominion Coal Co. has chartered for the season of 1905 the Cattalone, Mystic, Dominion, Tordensjold, Tanored, Brittanic, Harrod, Ovidia, Smyra, and the James Ross, in addition to the Company's own fleet, which comprises the steamers Coban, Louisburg, Cape Breton, Bonavista and Cacouna. The steamer Turpin has been chartered to be used in the coast trade alone. The largest steamer of the fleet is the James Ross, which is now building at Middlesburg, England, and which will have a capacity of 7,000 tons of coal.

The Canadian Pacific Railway has been making experiments on one of its locomotives with the burning of the anthracite coal coming from its new colliery near Banff. So far as the tests have gone they have proved satisfactory, and it is probable that the Company will use anthracite coal to a very great extent on its western lines in the future. In this respect the C.P.R. is but following the example of the Lehigh Valley R.R., in running the Black Diamond express, which has been successfully in operation for several years as a fast train. Locomotives burning hard coal require to have a fire box built specially for the purpose, as the heat from the combustion with anthracite is greater than that from the combustion of soft coal.

In the month of February the Dominion Coal Co. put out a total of 128,778 tons of coal, and shipped 106,295 tons. The output from the collieries was respectively as follows:—

	Output.
Dominion No. 1	29,094
" No. 2	24,999
" No. 3	10,989
" No. 4	27,752
" No. 5	21,571
" No. 7	3,890
" No. 8	.....
" No. 9	10,483
Total	128,778

The Dominion Coal Co. has finally decided to make an attempt to secure the markets of Toronto and Western Ontario for coal. In previous years Toronto, and other towns on Lake Ontario have been supplied by American coal companies, owing to ease of access by water routes across the Lake. The Coal Company's Directors think that this market should belong to Canadian coal companies, and will make an effort the coming season to secure it by employing a special class of boats to handle coal between Montreal and Toronto. The Company will also construct large coal pockets at Toronto, which will be used as the principal distributing centre for Ontario. A large number of contracts have been made in Toronto with some of the most prominent industrial concerns in that city, and other contracts have been made for the towns of Prescott, Brockville, Kingston, and places between Montreal and Toronto.

Presidential Address.

Delivered by EUGENE COSTE, E.M., at the Montreal Meeting, Mar. 12, 1905.

I take great pleasure in welcoming the members of the Canadian Mining Institute to this, our seventh Annual General Meeting.

That Canada is to-day already one of the great mining countries of the world is proved and admitted; that untold wealth of mineral resources still remain untouched in many parts of our vast undeveloped country is also fully recognized by our mining engineers and geologists, and by many others who have studied the question.

Could we not, all of us of the Canadian Mining Institute, the only incorporated Institute representing the mining men from the whole country, do more than we are doing to hasten a more rapid and healthy development and progress of this immense mineral wealth of Canada? I have no hesitation in saying yes; we can do much more, and it is our duty to do it; our duty to ourselves; our duty to our profession and industry; our duty to our great country. We are already a strong organization of nearly 500 members, and as I said last year, we have done a great deal in the past, but we can do and must do much more in the future.

Our country is now growing very rapidly,—millions of dollars are going to be spent in constructing railways through vast new stretches of our country,and many opportunities to open and develop new mining districts will thus be presented to all of us. Thus the problems confronting us in our mining profession and industry, whether scientific, economic, of legislation, of transportation, of treatment or of any other nature, will soon multiply even more rapidly, and we must be ready to creditably consider and solve all these problems and difficulties. Already our mining interests have expanded largely of late years; as an instance of it, we have this year on our programme not less than fifty papers, and it is impossible for us to give to all these papers the necessary attention and discussion at this meeting. We are outgrowing our old clothes and we must cut our next suit on larger and broader lines. Many of the mining problems of the future will no doubt be settled directly and individually by some of us, but we can only hope to successfully master all the many other questions and responsibilities which individual enterprise or energy alone will fail to solve or fulfill, by uniting still more firmly and on a broader basis. "Union is Strength," and in my opinion the time has come for the members of the Canadian Mining Institute to adopt the necessary changes in the Constitution and by-laws of the Institute which will bring about these results.

The constitution or by-laws of any institute or society is of course the final guide and mainstay of it, and once a provision or rule is adopted and placed there, the officers of that institute or society have then the necessary machinery to work with and the power to put this machinery into motion. It only remains for them to watch its work with zeal, care and intelligence.

These necessary changes or additions to our present machinery, as I propose them, will be found at length in the set of new by-laws, copies of which I have sent to every member, but briefly stated, they are:—

(a) A larger representation of the members on our Board or Council of the Institute.

(b) The formation of strong branches of the Institute in the different Provinces and in some of the important mining districts of the country.

Those who have taken an active part in the affairs of the Institute in the past are a unit, I believe, in admitting that it has been very often next to impossible to have a good representative meeting of the Board or Council of the Institute, as at present constituted. The most of these gentlemen are so far away that they can hardly ever attend Council meetings, and as at present organized, one half of our Council is practically unavailable to us, while on the other hand, the other half, is not the help to them we should be. This state of affairs is not broad enough and is not conducive to our acquiring a thorough knowledge of, or to our giving the necessary attention to, the many questions and problems affecting at all times the mining industries in the different provinces or districts of our vast country. Nor is it promoting the mutual help and intercourse among the members, which is one of the most important objects and mission of our Institute.

I submit, therefore, that in the best interests of the Institute we should now organize differently in order that in the future a good many more members from all over the country would in some way join the few who alone have acted in the past, and would become in common with them active thinkers, advisers and managers in all the affairs and objects of the Institute.

It will readily be seen that the above proposed changes or additions to our by-laws will accomplish this, not only by enabling more of us to meet in Council in Montreal, Toronto, and other places in the central part of the country, as often as necessary, but also by the means of the branches we will be in constant communication and interchange of ideas with many of our distant members. These in the meetings of their branches, which can be held several times a year if necessary, will bring up and discuss all the interesting subjects connected in any way with their local mining interests and industries, and their chairmen, secretaries, and full organizations will always be in touch with the central organization. Thereby the necessary activity and life will run through the Canadian Mining Institute from the Yukon to Cape Breton, together with the necessary spirit of mutual help and unanimity of purpose so necessary to permanent achievements.

As I expect that this subject will be fully discussed at another one of our sessions, it is unnecessary for me to refer to it now at greater length, but permit me in closing these few remarks, on this important matter, to give you an instance of what other Canadians have done with a similar organization to the one I advocate for the Greater Canadian Mining Institute. I refer to the Canadian Manufacturers' Association.

Mr. Coste then gave a summary of the growth and organization of the Manufacturers' Association, and declared the Sessions of the Seventh Annual Meeting open for the reading and discussion of the papers presented.

The Dominion Coal Company's Report.

The annual report of the Dominion Coal Co. was submitted to the general meeting held on the second day of March, 1905. The Directors' Report notes that the tonnage for 1904 was 124,244 tons less than for 1903, which deficiency is ascribed to the strike which occurred in midsummer among the Dominion Iron & Steel Co.'s employees. The net earnings for the year were $135,548 less than in 1903, which is accounted for chiefly by the increased cost of production during the first six months of the year. The passing of the dividend on the common stock is explained as sanctioned by the directors owing to their belief that it was better to apply the net earnings to pay for the improvements and expenditures necessitated by the opening of new mines, rather than to increase the floating debt of the Company for that purpose.

The chief improvements of the year were the opening of Dominion No. 6 on the Phelan seam and its connection with the main line of the Company's railway by a branch line six miles in length. A new water supply system has also been installed, obviating the occasional shutdowns due to dry seasons in summer and severe weather in winter. The total amount expended on capital account during the year was $500,487.98, of which amount $260,000 was provided for by securities of the Cape Breton Real Estate Company and the Dominion Rolling Stock Company; all other expenses were charged against operations during the year. First mortgage bonds amounting to $116,000, and a floating indebtedness of $469,118 were discharged, but new debentures were issued for new buildings and new rolling stock to the amount of $198,546.69, making a net decrease of liabilities to $368,571.38. The net increase in the assets of the Company amounted to $503,766.90. The directors' reply to the question of retiring the present bonds and preferred stock in favour of one class of securities was deferred until the return of better conditions, and until the financial markets are more buoyant than during the past year. During the year Mr. Emerson Bainbridge and Mr. Geo. B. Walker, of Great Britain, were employed by President Ross to make a thorough inspection of the mines and properties, methods of operation, etc., and their report is not published to the shareholders but is summarized briefly. This summary contains nothing of technical interest to the readers of the Review, and nothing which our readers did not know beforehand; the reason for the employment of these experts is not made apparent. The facts that the Coal Company possesses properties of great value, containing immense quantities of coal, advantageously situated, were well known to every person of ordinary intelligence beforehand, but the Directorate have seen fit to only publish 15 or 16 lines from the report of these authorities, which lines contain nothing that was not known thoroughly before, and nothing which is of any importance to the shareholders.

Eighth Report War Eagle Consolidated Mining Company.

In this report the Financial Statement shows assets, $2,308,151.61 if the valuation of the claims is admitted; this valuation is put at $1,699,329.39. The amount of stores on hand is put at $10,335.50; accounts receivable, $25,898.58; cash on hand, $39,236, and the profit and loss statement is $237,822.75. The over draft on the Bank of Toronto at Rossland amounts to $96,378.60; the present indebtedness to Mr. Geo. Gooderham, $451,667.44 and accounts payable to $10,050. No mention is made in the report of the success or failure of the Rossland Power Company's mill, and neither President Gooderham's nor Manager Kirby's report gives any information of particular value to shareholders. The assay value of the ore shipped during the year (amounting to 56,760 tons) is given as $12.18 against $13.00 for 1903. The reserves are put at the small figure of 23,000 tons, showing a value of only $8.50. The smelters gross assay value up to the end of the year resulted, as usual, in an excess of expenses over receipts. The noteworthy item of the whole report is that the cost of winning the ore has been reduced to $2.24 and the total cost of mining, including development work, down to $3.00 per ton. We are firmly of the belief that the sooner the War Eagle is closed down, the better it will be for the shareholders, especially the better it will be for Mr. Geo. Gooderham's private bank account.

Digest of Recent Patents; Mining and Metallurgical.

CANADIAN.

Feb. 7, 1905.

782,124.—Method of Converting Matte. Oliver S. Garretson, Buffalo, N.Y., assignor to Garretson Furnace Company, Pittsburg, Pa., a corporation of West Virginia. A method which consists in converting matte by a blast underneath a column of material containing a flux, removing the slag, allowing the matte accompanying the slag to settle, removing the superincumbent slag, practically free from matte, exposing the slag to heat, which sweeps over the surface of the slag and keeps the slag in a freely-flowing condition, and intermittently adding sulfur-bearing material to the slag for producing a low-grade matte, which combines with any values contained in the slag.

781,807.—Process of Smelting Native-Copper-Bearing Rock. Franklin R. Carpenter, Denver, Colo. A process which consists in adding thereto basic material, to form a slag and a sulfid material to form a matte or carrier for the native copper, and, incidentally, the gold and silver that may be present and smelting the mixture.

782,078.—Ore Concentrator. Albert H. Stebbins, Little Rock, Ark. The combination of a frame, a concentrating surface supported by said frame, a series of concentrate-guides disposed diagonally over the concentrate-surface, a series of tailing-guides disposed above the concentrate-guides, said concentrate and tailing guides being arranged at an angle to each other, the concentrating surface being formed of sheet material having perforations therein, the walls of which are offset to direct fluid-currents over or substantially parallel to the said surface.

781,834.—Metallurgical Furnace. Richard L. Lloyd and Peter Thill, Greatfalls, Mont. The combination of a hearth forming a continuous longitudinally-curved path for the ore, extending from the mouth to the discharge of the furnace, and disposed about a vertical axis, reciprocating feeding mechanism, means for causing it to follow the curve of the hearth in feeding the ore, and means for withdrawing it from contact with the ore during its backward stroke.

782,145.—Process of Producing Pure Copper. Louis M. LaFontaine, Paris, France. A process which consists in forming the copper-producing ores into suitable plates for anodes without previously treating the ores, and subjecting said plates to an electrolytic bath whereby an electric current causes dissolution of the copper in said plates and transfers it to the cathodes of the cell.

782,425.—Gold-Separating Machine. Fred. C. Stevenson and Charles E. Heft, Grants Pass, Oreg., assignors of one-half to George W. Sanford, Honeyoye Falls, and Charles M. Smith, Marion, N.Y. An inner cylinder mounted upon a shaft, an outer cylinder mounted upon independent bearings, a train of gear-wheels connecting the cylinders to revolve them in opposite directions and at different speeds, annular ribs within the outer cylinder, the inner cylinder divided longitudinally and perforated, and a hopper and screen connected therewith.

782,264.—Machine for Crushing Ores or Other Uses. David J. Nevill, Salt Lake City, Utah. The combination with a pair of rolls and a movable bearing at each end of one of said rolls, of a spring for each of said bearings, two pressure-plates which are independently movable and between which the spring is supported, and means for transmitting the movement of the bearings in one direction to one of the plates, and means for transmitting the movement of the bearings in the opposite direction to the other plate, and an adjustable rigid abutment for the plates farthest from the bearing.

782,259.—Retort Coke-Oven. Clyde S. Mason, Buffalo, N.Y. The combination of a series of horizontal retort-ovens, combustion-chambers below the same, vertical heating-flues arranged between adjacent ovens and communicating at their lower ends with the combustion-chambers, and a plurality of horizontal flues between adjacent ovens, one of said flues communicating with the upper ends of the vertical flues and another of said flues extending from side to side of the series of ovens, the wall or walls separating, said horizontal flues being provided with openings for equalizing the flow of the gases.

782,235.—Ore-Sampler. Andrew G. Gullberg, New York, N.Y., assignor of one-half to Frank Klepetko, New York, N.Y. An automatic sampler, a suitable oscillating cutter or sample-hopper, an oscillating lock-lever, intermediate connections between the lever and cutter, and suitable driving mechanisms for actuating the lock-lever and cutter.

Feb. 21, 1905.

783,304.—Ore Concentrator. Michael E. Parks, Torreon, Mexico. An ore-concentrator, comprising an outer structure, transverse forward and rearward vertical partitions dividing the interior thereof into a concentrator-box, a tailings-box, and a slimes-box, and a vertically-reciprocatory jigger in the concentrator-box, combined with means for operating the same, said rearward partition being less in height than the walls of the structure, and said forward partition less in height than the rearward partition, the inner side of the jigger being also less in height than the outer side thereof.

783,323.—Ore-Crusher. Frank P. Snow, Los Angeles, Cal., assignor to Frederick W. Braun, Los Angeles, Cal. A rock-crusher having a suitable hopper or receptacle for the rock, a vertically-removable stationary jaw, adjustably secured at its lower end within the frame; a vibrative jaw mounted at its upper end upon an eccentric driving-shaft; an independent vibrative toggle pivoted in a plane below the free end of the vibrative jaw and having its outer end located within the lower end of said jaw, and a spring connected with the vibrative jaw and with the frame; whereby a circular or gyratory movement is imparted to the upper end of the vibrative jaw and the lower end of the same is caused to describe an arc of small amplitude, thus imparting an oscillatory and vibrative movement to the lower end.

782,893.—Method of Treating Alkali-Metal Amalgam. Charles E. Baker and Arthur W. Burwell, Cleveland, Ohio. A process which consists in heating the amalgam in presence of hydrogen to form a hydrid of the alkali metal, distilling the mercury, then increasing the temperature to decompose said hydrid and free the alkali metal.

Feb. 28, 1905.

783,600.—Process of Extracting Copper from Ores. George H. Waterbury, Denver, Colo., assignor to The Waterbury Metals Extraction Company, Spokane, Wash. A process consisting in placing the suitably-pulverized ore in a solution composed of water saturated with sulfurous acid and containing a comparatively small quantity of sulfuric acid, subjecting the mass to agitation until the copper is dissolved, drawing off the solution containing the copper and placing it in a receptacle containing metal sufficiently divided to allow the solution to circulate there through, and subjecting the solution to agitation until the copper is precipitated.

783,736.—Electric Furnace. George O. Seward, Holcombs Rock, Va., assignor to the Wilson Aluminium Company, New York, N.Y., a corporation of New York. The combination with an electric furnace cover through which an electrode passes, of a separate-lid forming a complete ring around the electrode for holding the same in position, said lid having a passage for the circulation of cooling-water.

783,905.—Ball-Mill. Otto Spine, Brunswick, Germany. A ball-mill having a rotatable body which downwardly and outwardly flares to a substantially horizontal rim, the latter being provided with radial partitions, a fixed rim with which the rim of the body cooperates, and a cover removably and fixedly held on the upper portion of the body and having its lower edge located inwardly at a distance from the upper edge of the fixed rim.

783,535.—Smelting-Furnace. Michael Murphy, Pueblo, Colo., assignor of one-half to Fred. W. Lucco, Pueblo, Colo. A smelting-furnace having a transverse air-passage below the ore bed and just in rear of the bridge-wall the ends of which extend through the side walls of the furnace and communicate with the outer air, and a series of longitudinal air-passages beneath the ore-bed communicating at their front ends with the transverse air-passage and having their rear ends communicating with the outer air.

783,903.—Ore-Furnace. August Skoog, Shreveport, La. The combination with a plurality of vertically-disposed alternately-arranged fire and ore chambers, a transverse partition in the fire-chambers, oppositely-located fire-boxes, one for each fire-chamber, said fire-chambers having openings in their end walls through which the products of the fires are delivered in opposite directions, tilting arranged in the ore-chambers in staggered formation whereby a sinuous passage is provided for the ore, said tilting arranged to provide passages at the extreme ends of the chambers through which the products of combustion will travel upwardly, means for feeding material to the ore-chambers, and means for discharging the ore from said chambers.

PROVINCE OF NOVA SCOTIA.

Leases for Mines of Gold, Silver, Coal, Iron, Copper, Lead, Tin

—AND—

PRECIOUS STONES.

TITLES GIVEN DIRECT FROM THE CROWN, ROYALTIES AND RENTALS MODERATE.

GOLD AND SILVER.

Under the provisions of Chap. 1, Acts of 1892, of Mines and Minerals, Licenses are issued for prospecting Gold and Silver for a term of twelve months. Mines of Gold and Silver are laid off in areas of 150 by 250 feet, any number of which up to one hundred can be included in one License, provided that the length of the block does not exceed twice its width. The cost is 50 cents per area. Leases of any number of areas are granted for a term of 40 years at $2.00 per area. These leases are forfeitable if not worked, but advantage can be taken of a recent Act by which on payment of 50 cents annually for each area contained in the lease it becomes non-forfeitable if the labor be not performed.

Licenses are issued to owners of quartz crushing mills, who are required to pay Royalty on all the Gold they extract at the rate of two per cent. on smelted Gold valued at $19 an ounce, and on smelted Gold valued at $18 an ounce.

Applications for Licenses or Leases are receivable at the office of the Commissioner of Public Works and Mines each week day from 10 a.m. to 4 p.m., except Saturday, when the hours are from 10 to 1. Licenses are issued in the order of application according to priority. If a person discovers Gold in any part of the Province, he may stake out the boundaries of the areas he desires to obtain, and this gives him one week and twenty-four hours for every 15 miles from Halifax in which to make application at the Department for his ground.

MINES OTHER THAN GOLD AND SILVER.

Licences to search for eighteen months are issued, at a cost of thirty dollars, for minerals other than Gold and Silver, out of which areas can be selected for mining under lease. These leases are for four renewable terms of twenty years each. The cost for the first year is fifty dollars, and an annual rental of thirty dollars secures each lease from liability to forfeiture for non-working.

All rentals are refunded if afterwards the areas are worked and pay royalties. All titles, transfers, etc., of minerals are registered by the Mines Department for a nominal fee, and provision is made for lessees and licensees whereby they can acquire promptly, either by arrangement with the owner or by arbitration, all land required for their mining works.

The Government as a security for the payment of royalties, makes the royalties first lien on the plant and fixtures of the mine.

The unusually generous conditions under which the Government of Nova Scotia grants its minerals have introduced many outside capitalists, who have always stated that the Mining laws of the Province were the best they had had experience of.

The royalties on the remaining minerals are : Copper, four cents on every unit ; Lead, two cents upon every unit ; Iron, five cents on every ton ; Tin and Precious Stones, five per cent. ; Coal, 10 cents on every ton sold.

The Gold district of the Province extends along its entire Atlantic coast, and varies in width from 10 to 40 miles, and embraces an area of over three thousand miles, and is traversed by good roads and accessible at all points by water. Coal is known in the Counties of Cumberland, Colchester, Pictou and Antigonish, and at numerous points in the Island of Cape Breton. The ores of Iron, Copper, etc., are met at numerous points, and are being rapidly secured by miners and investors.

Copies of the Mining Law and any information can be had on application to

THE HON. A. DRYSDALE,
Commissioner Public Works and Mines,
HALIFAX, NOVA SCOTIA.

PROVINCE OF QUEBEC

The attention of Miners and Capitalists in the United States and in Europe is invited to the

GREAT MINERAL TERRITORY

Open for investment in the Province of Quebec.

Gold, Silver, Copper, Iron, Asbestos, Mica, Plumbago, Phosphate, Chromic Iron, Galena, Etc.

ORNAMENTAL AND STRUCTURAL MATERIALS IN ABUNDANT VARIETY.

The Mining Law gives absolute security to Title, and has been specially framed for the encouragement of Mining.

Mining concessions are divided into three classes :—

1. In unsurveyed territory (*a*) the first class contains 400 acres, (*b*) the second, 200 acres, and (*c*) the third, 100 acres.

2. In surveyed townships the three classes respectively comprise one, two and four lots.

All lands supposed to contain mines or ores belonging to the Crown may be acquired from the Commissioner of Colonization and Mines (*a*) as a mining concession by purchase, or (*b*) be occupied and worked under a mining license.

No sale of mining concessions containing more than 400 acres in superficies can be made by the Commissioner to the same person. The Governor-in-Council may, however, grant a larger extent of territory up to 1,000 acres under special circumstances.

The rates charged and to be paid in full at the time of the purchase are $5 and $10 per acre for mining lands containing the superior metals* ; the first named price being for lands situated more than 12 miles and the last named for lands situated less than 12 miles from the railway.

If containing the inferior metal, $2 and $4 according to distance from railway

Unless stipulated to the contrary in the letters patent in concessions for the mining of superior metals, the purchaser has the right to mine for all metals found therein ; in concessions for the mining of the inferior metals, those only may be mined for.

*The superior metals include the ores of gold, silver, lead, copper, nickel, graphite, asbestos, mica, and phosphate of lime. The words inferior metals include all other minerals, and ores.

Mining lands are sold on the express condition that the purchaser shall commence *bona fide* to mine within two years from the date of purchase, and shall not spend less than $500 if mining for the superior metals ; and not less than $200 if for inferior metals. In default, cancellation of sale of mining lands

(*b*) Licenses may be obtained from the Commissioner on the following terms :—Application for an exploration and prospecting license, if the mine is on private land, $2 for every 100 acres or fraction of 100 ; if the mine is on Crown lands (1) in surveyed territory, $5 for every 100 acres, and (2) in unsurveyed territory, $5 for each square mile, the license to be valid for three months and renewable. The holder of such license may afterwards purchase the mine, paying the prices mentioned.

Licenses for mining are of two kinds: Private lands licenses where the mining rights belong to the Crown, and public lands licenses. These licenses are granted on payment of a fee of $5 and an annual rental of $1 per acre. Each license is granted for 200 acres or less, but not for more ; is valid for one year, and is renewable on the same terms as those on which it was originally granted. The Governor-in-Council may at any time require the payment of the royalty in lieu of fees for a mining license and the annual rental—such royalties, unless otherwise determined by letters patent or other title from the Crown, being fixed at a rate not to exceed three per cent. of the value at the mine of the mineral extracted after deducting the cost of mining it.

The fullest information will be cheerfully given on application to

THE MINISTER OF LANDS, MINES AND FISHERIES,
PARLIAMENT BUILDINGS, QUEBEC.

Ontario's Mining Lands..

THE Crown domain of the Province of Ontario contains an area of over 100,000,000 acres, a large part of which is comprised in geological formations known to carry valuable minerals and extending northward from the great lakes and westward from the Ottawa river to the Manitoba boundary.

Iron in large bodies of magnetite and hematite: copper in sulphide and native form; gold, mostly in free milling quartz; silver, native and sulphides; zincblende, galena, pyrites, mica, graphite, talc, marl, brick clay, building stones of all kinds and other useful minerals have been found in many places, and are being worked at the present time.

In the famous Sudbury region Ontario possesses one of the two sources of the world's supply of nickel, and the known deposits of this metal are very large. Recent discoveries of corundum in Eastern Ontario are believed to be the most extensive in existence.

The output of iron, copper and nickel in 1903 was much beyond that of any previous year, and large developments in these industries are now going on.

In the older parts of the Province salt, petroleum and natural gas are important products.

The mining laws of Ontario are liberal, and the prices of mineral lands low. Title by freehold or lease, on working conditions for seven years. There are no royalties.

The climate is unsurpassed, wood and water are plentiful, and in the summer season the prospector can go almost anywhere in a canoe.

The Canadian Pacific Railway runs through the entire mineral belt.

For reports of the Bureau of Mines, maps, mining laws, etc., apply to

HONORABLE E. J. DAVIS,
Commissioner of Crown Lands,

or

THOS. W. GIBSON,
Director Bureau of Mines,
Toronto, Ontario.

Dominion of Canada

SYNOPSIS OF REGULATIONS

For disposal of Minerals on Dominion Lands in Manitoba, the North-west Territories and the Yukon Territory.

COAL.

Coal lands may be purchased at $10 per acre for soft coal and $20 for anthracite. Not more than 320 acres can be acquired by one individual or company. Royalty at the rate of ten cents per ton of 2,000 pounds shall be collected on the gross output.

QUARTZ.

Persons of eighteen years and over and joint stock companies holding free miner's certificates may obtain entry for a mining location.

A free miner's certificate is granted for one or more years, not exceeding five, upon payment in advance of $7.50 per annum for an individual, and from $50 to $100 per annum for a company, according to capital.

A free miner, having discovered mineral in place, may locate a claim 1500 x 1500 feet by marking out the same with two legal posts, bearing location notices, one at each end on the line of the lode or vein.

The claim shall be recorded within 15 days if located within ten miles of a mining recorder's office, one additional day allowed for every additional ten miles or fraction. The fee for recording a claim is $5.

At least $100 must be expended on the claim each year or paid to the mining recorder in lieu thereof. When $500 has been expended or paid, the locator may, upon having a survey made, and upon complying with other requirements, purchase the land at $1.00 an acre.

Permission may be granted by the Minister of the Interior to locate claims containing iron and mica, also copper, in the Yukon Territory of an area not extending 160 acres.

The patent for a mining location shall provide for the payment of a Royalty ot 2½ per cent. of the sales of the products of the location.

PLACER MINING.

Manitoba and the N. W. T., excepting the Yukon Territory.—Placer mining claims generally are 100 feet square; entry fee $5, renewable yearly. On the North Saskatchewan River claims are either bar or bench, the former being 100 feet long and extending between high and low water mark. The latter includes bar diggings, but extends back to the base of the hill or bank, but not exceeding 1,000 feet. Where steam power is used, claims 200 feet wide may be obtained.

Dredging in the rivers of Manitoba and the N. W. T., excepting the Yukon Territory.—A free miner may obtain only two leases of five miles each for a term of twenty years, renewable in the discretion of the Minister of the Interior.

The lessee's right is confined to the submerged bed or bars of the river below low water mark, and subject to the rights of all persons who have, or who may receive entries for bar diggings or bench claims, except on the Saskatchewan River, where the lessee may dredge to high water mark on each alternate leasehold.

The lessee shall have a dredge in operation within one season from the date of the lease for each five miles, but where a person or company has obtained more than one lease one dredge for each fifteen miles or fraction is sufficient. Rental, $10 per annum for each mile of river leased. Royalty at the rate of two and a half per cent. collected on the output after it exceeds $10,000.

DREDGING IN THE YUKON TERRITORY.

Six leases of five miles each may be granted to a free miner for a term of twenty years, also renewable.

The lessee's right is confined to the submerged bed or bars in the river below low water mark, that boundary to be fixed by its position on the 1st day of August in the year of the date of the lease.

The lessee shall have one dredge in operation within two years from the date of the lease, and one dredge for each five miles within six years from such date. Rental, $100 per mile for first year and $10 per mile for each subsequent year. Royalty, same as placer mining.

PLACER MINING IN THE YUKON TERRITORY.

Creek, gulch, river and hill claims shall not exceed 250 feet in length, measured on the base line or general direction of the creek or gulch, the width being from 1,000 to 2,000 feet. All other placer claims shall be 250 feet square.

Claims are marked by two legal posts, one at each end, bearing notices. Entry must be made within ten days, if the claim is within ten miles of mining recorder's office. One extra day allowed for each additional ten miles or fraction.

The person or company staking a claim must hold a free miner's certificate.

The discoverer of a new mine is entitled to a claim of 1,000 feet in length, and if the party consists of two, 1,500 feet altogether, on the output of which no royalty shall be charged, the rest of the party ordinary claims only.

Entry fee, $10. Royalty at the rate of two and one-half per cent. on the value of the gold shipped from the Yukon Territory to be paid to the Comptroller.

No free miner shall receive a grant of more than one mining claim on each separate river, creek or gulch, but the same miner may hold any number of claims by purchase, and free miners may work their claims in partnership by filing notice and paying fee of $2. A claim may be abandoned, and another obtained on the same creek, gulch or river, by giving notice and paying a fee.

Work must be done on a claim each year to the value of at least $200. A certificate that work has been done must be obtained each year; if not, the claim shall be deemed to be abandoned, and open to occupation and entry by a free miner.

The boundaries of a claim may be defined absolutely by having a survey made and publishing notices in the Yukon Official Gazette.

PETROLEUM.

All unappropriated Dominion Lands in Manitoba, the North-West Territories and within the Yukon Territory are open to prospecting for petroleum, and the Minister may reserve for an individual or company having machinery on the land to be prospected, an area of 640 acres. Should the prospector discover oil in paying quantities, and satisfactorily establish such discovery, an area not exceeding 640 acres, including the oil well and such other land as may be determined, will be sold to the discoverer at the rate of $1.00 an acre subject to royalty at such rate as may be specified by order-in-council.

Department of the Interior.

Ottawa, February, 1904.

W. W. CORY,
Deputy of the Minister of the Interior.

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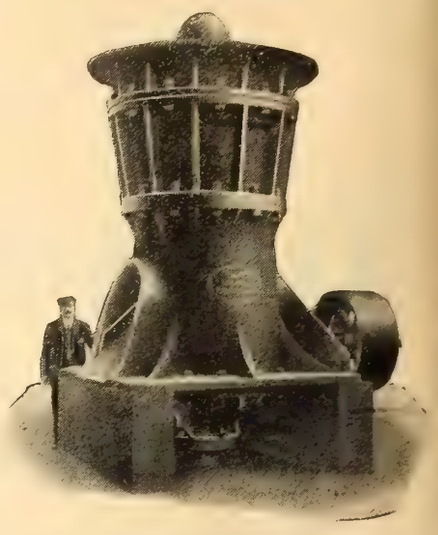

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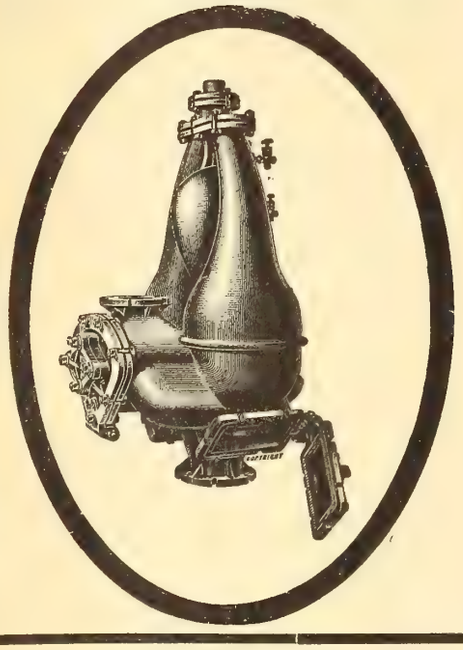

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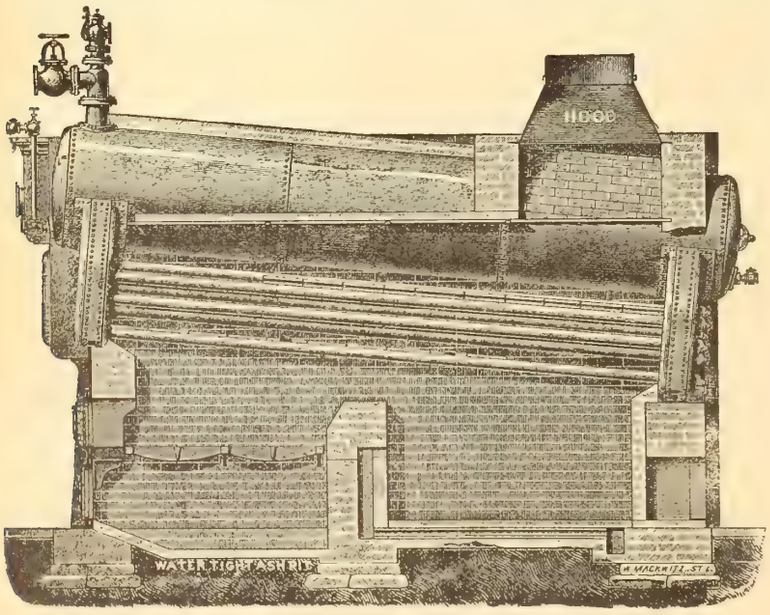

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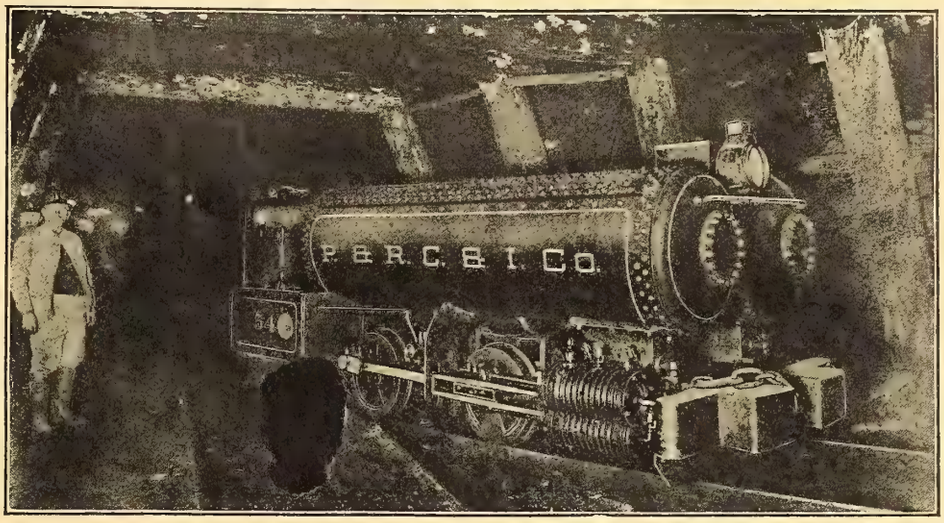

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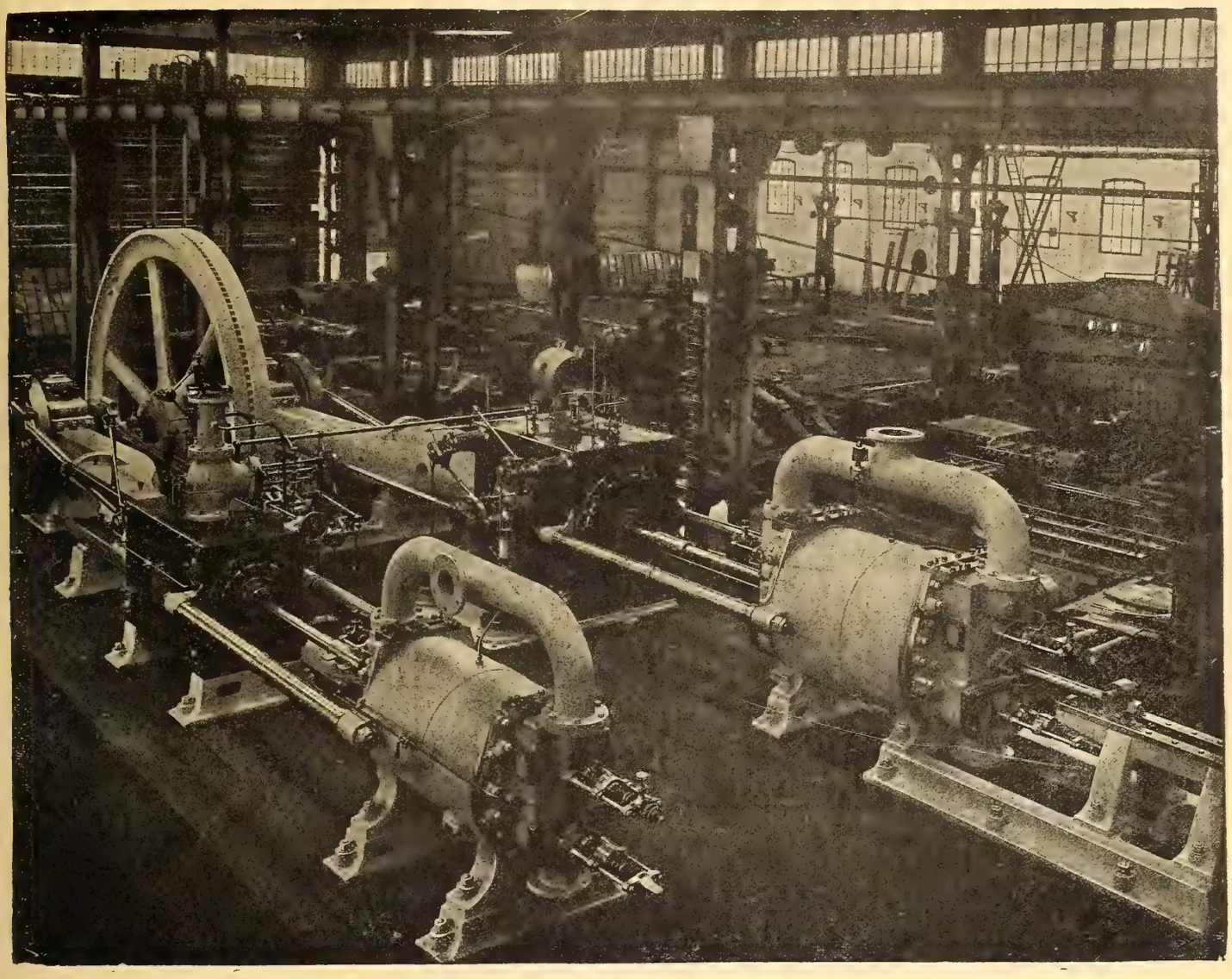

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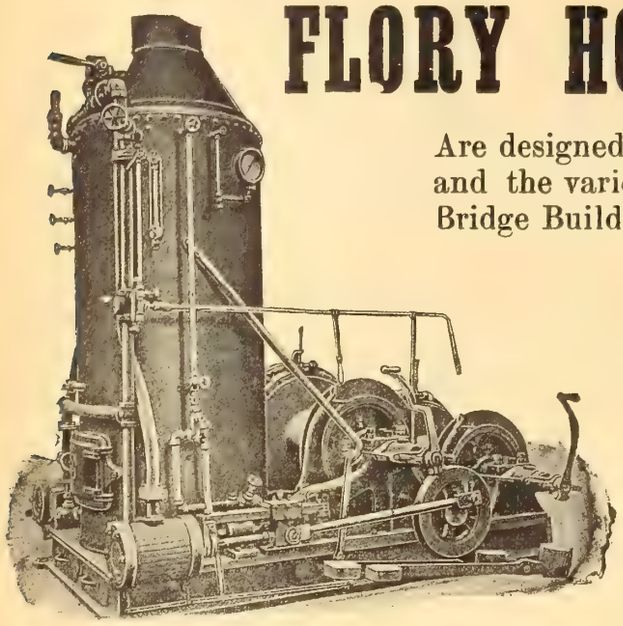

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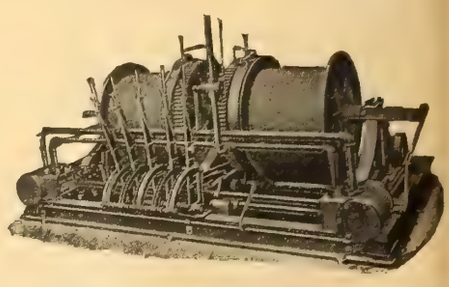

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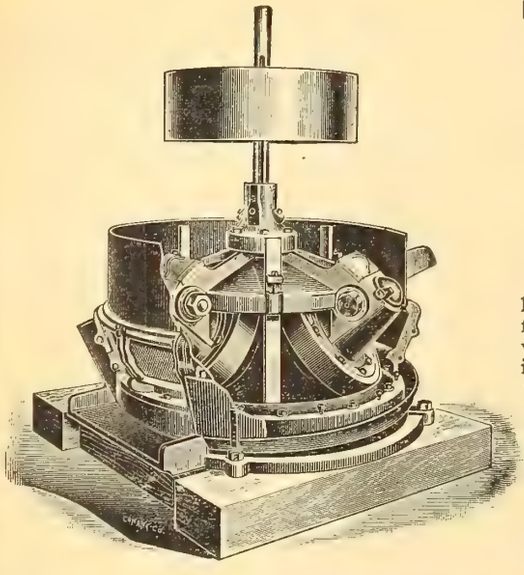

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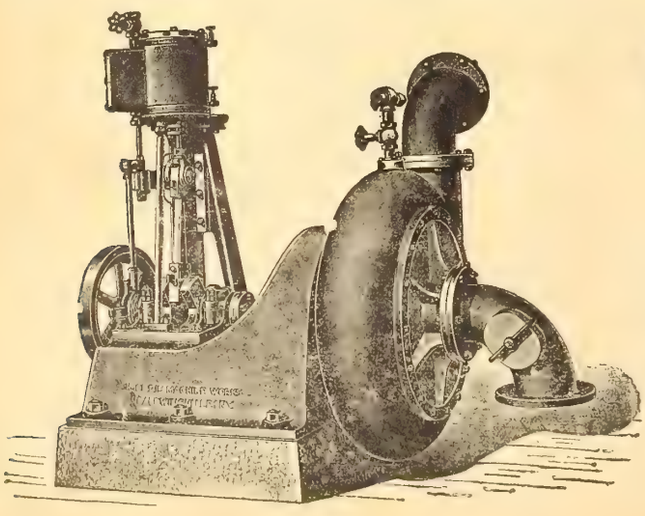

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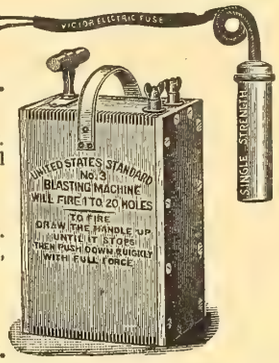

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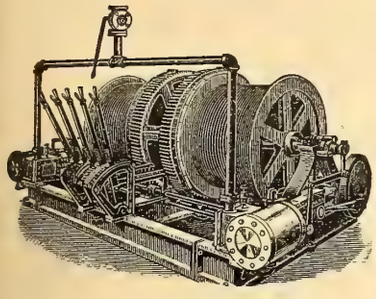

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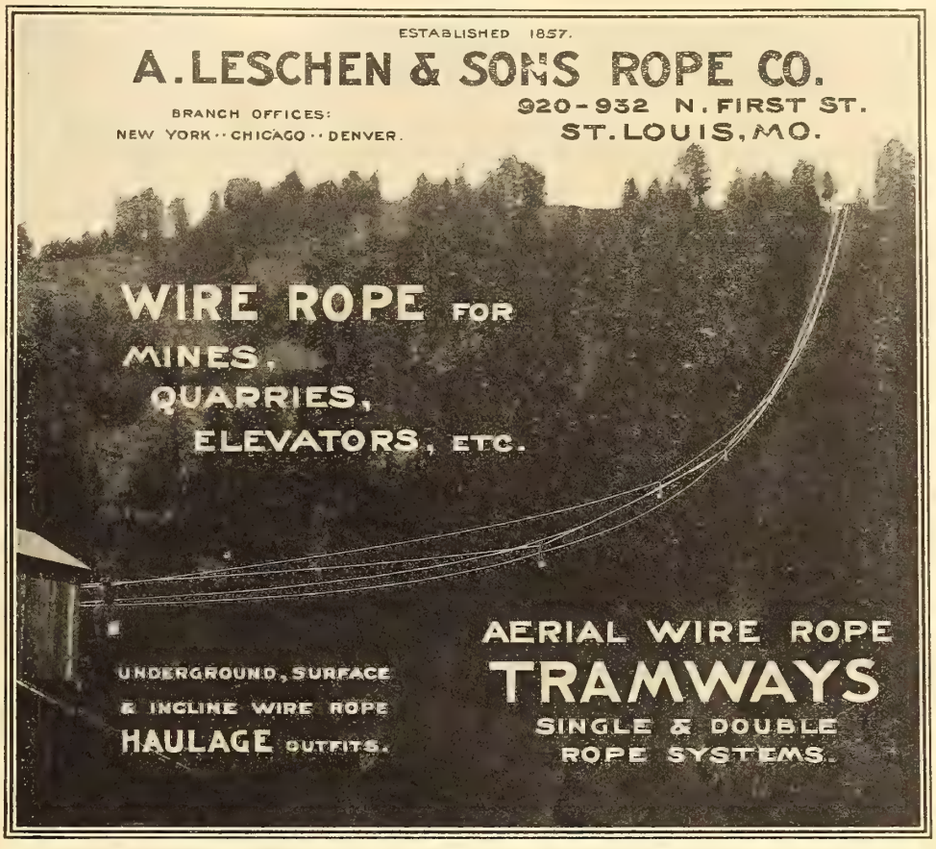

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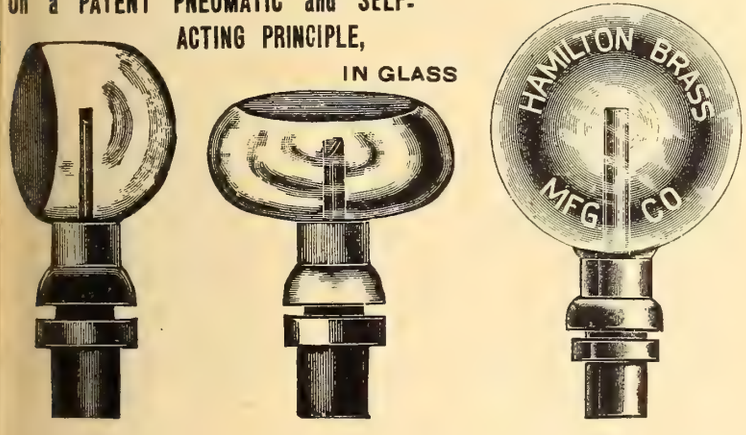

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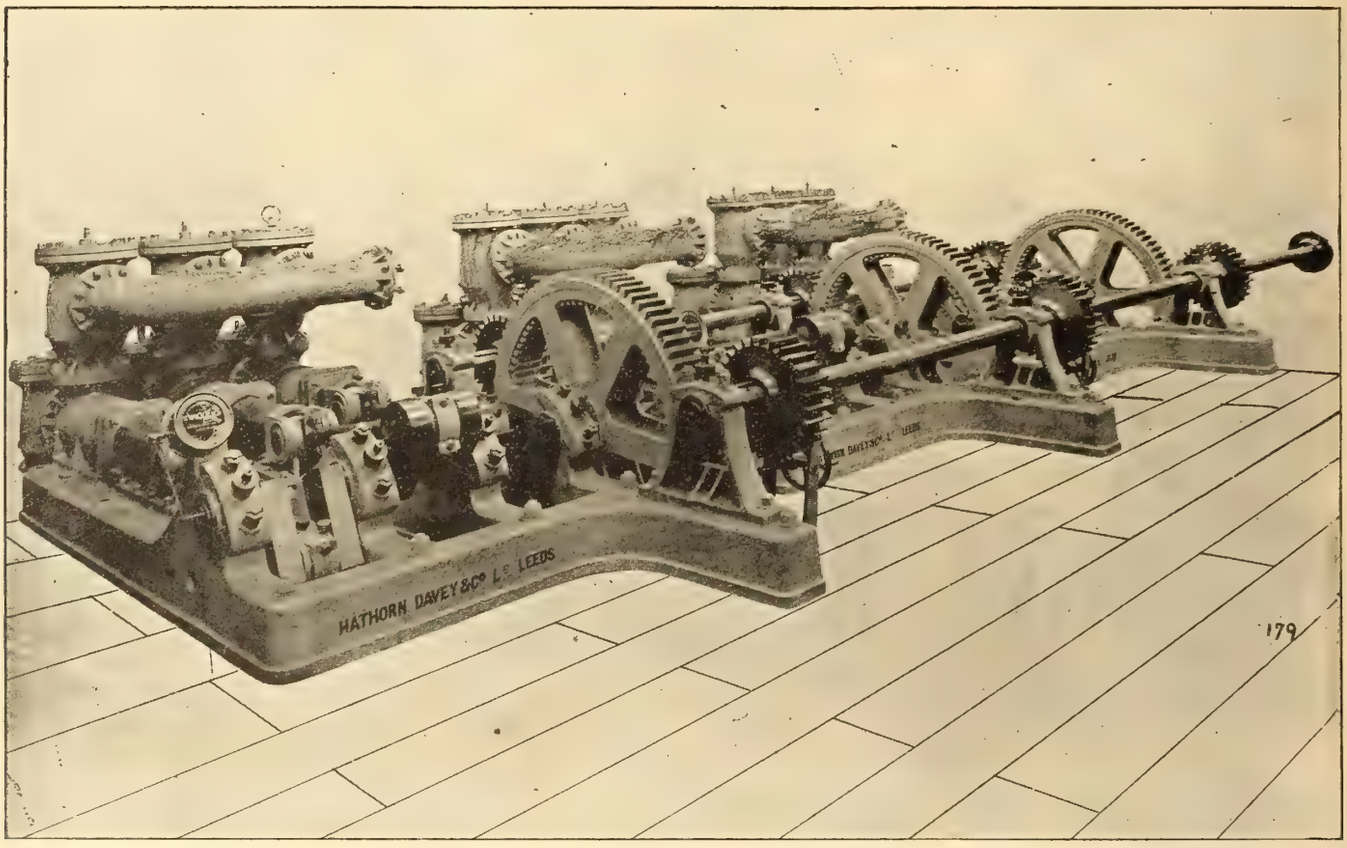

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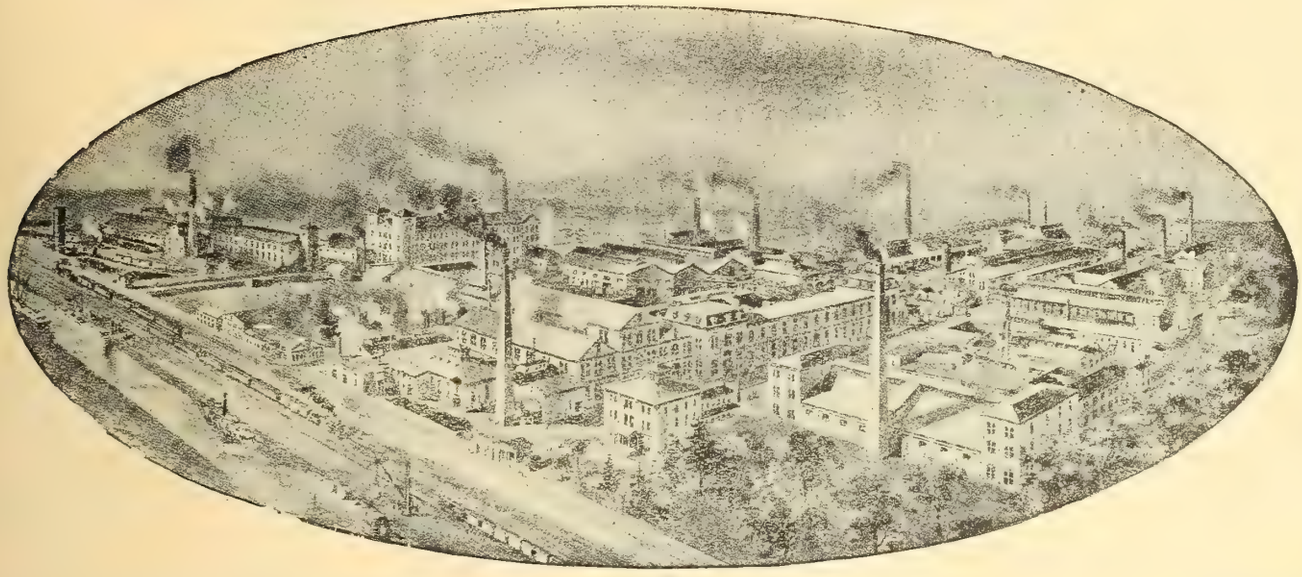

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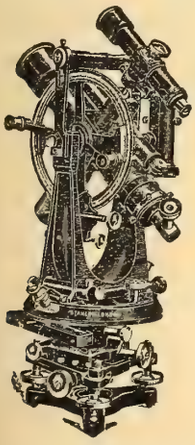

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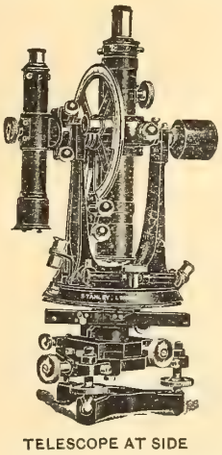

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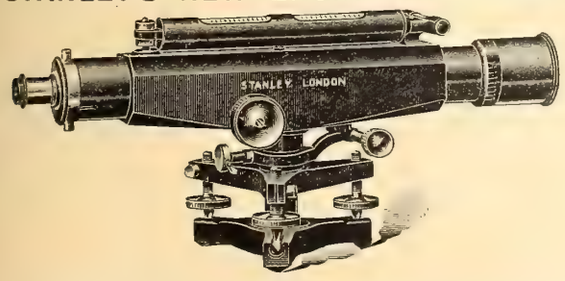

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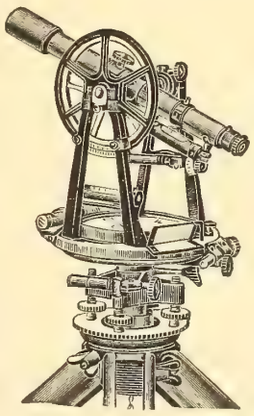

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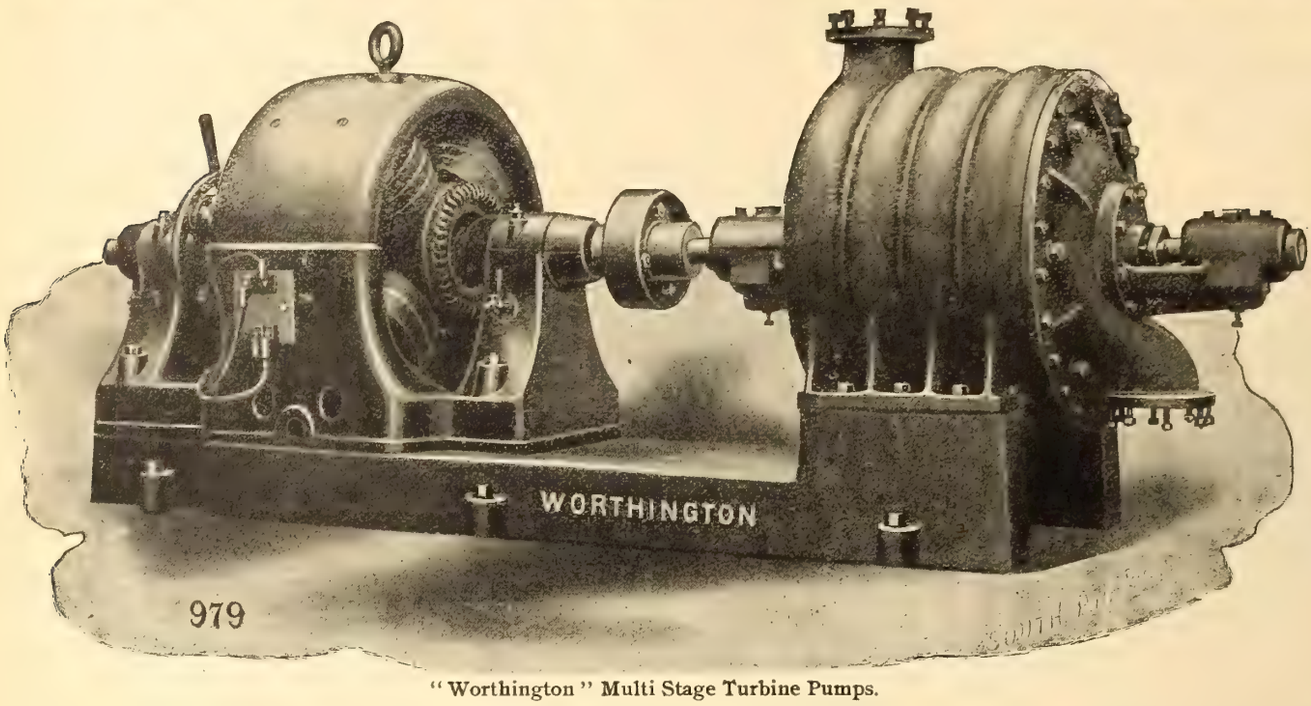

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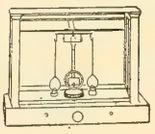

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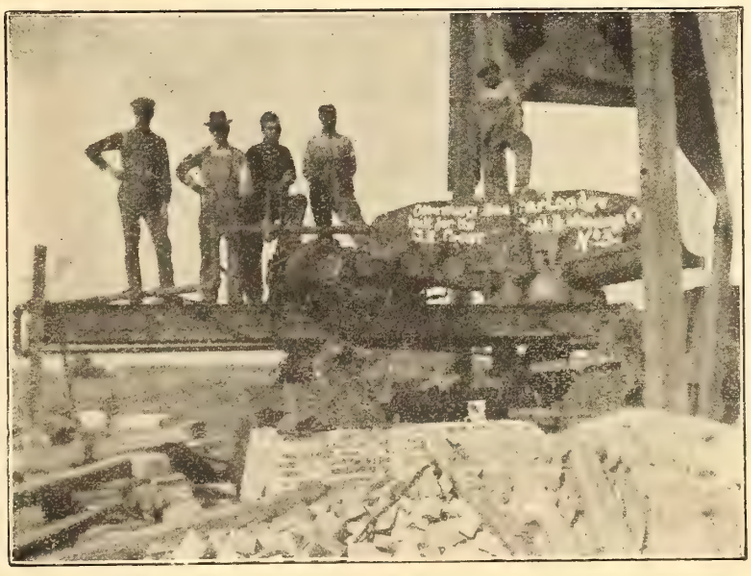

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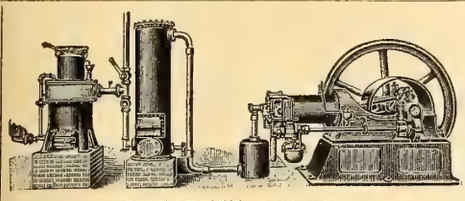

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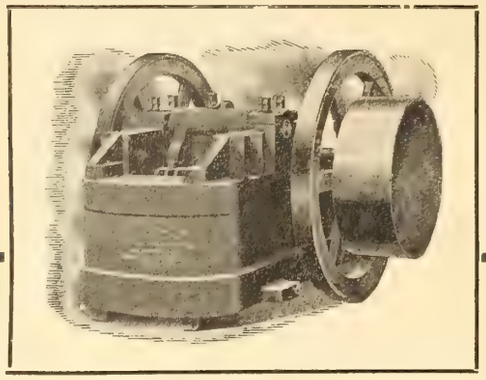

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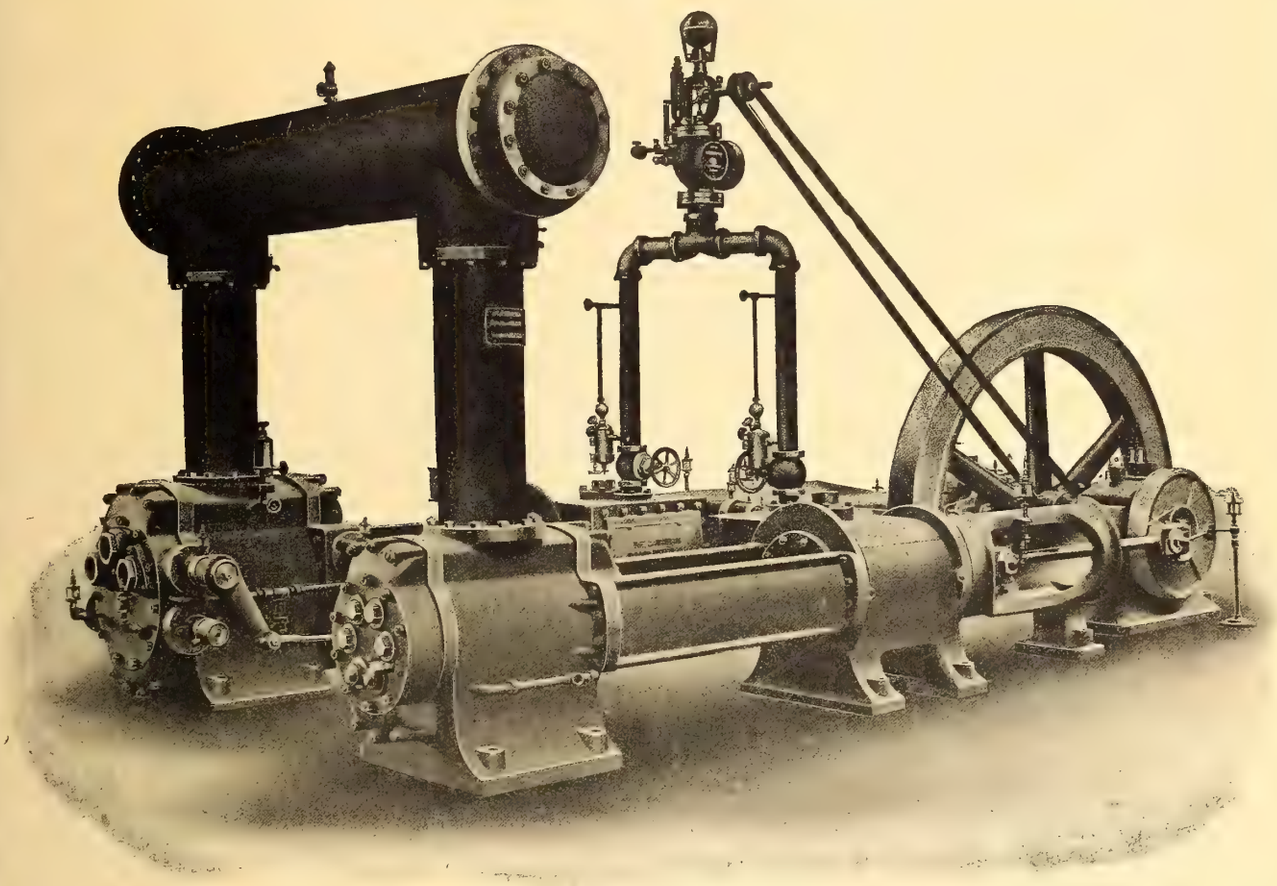

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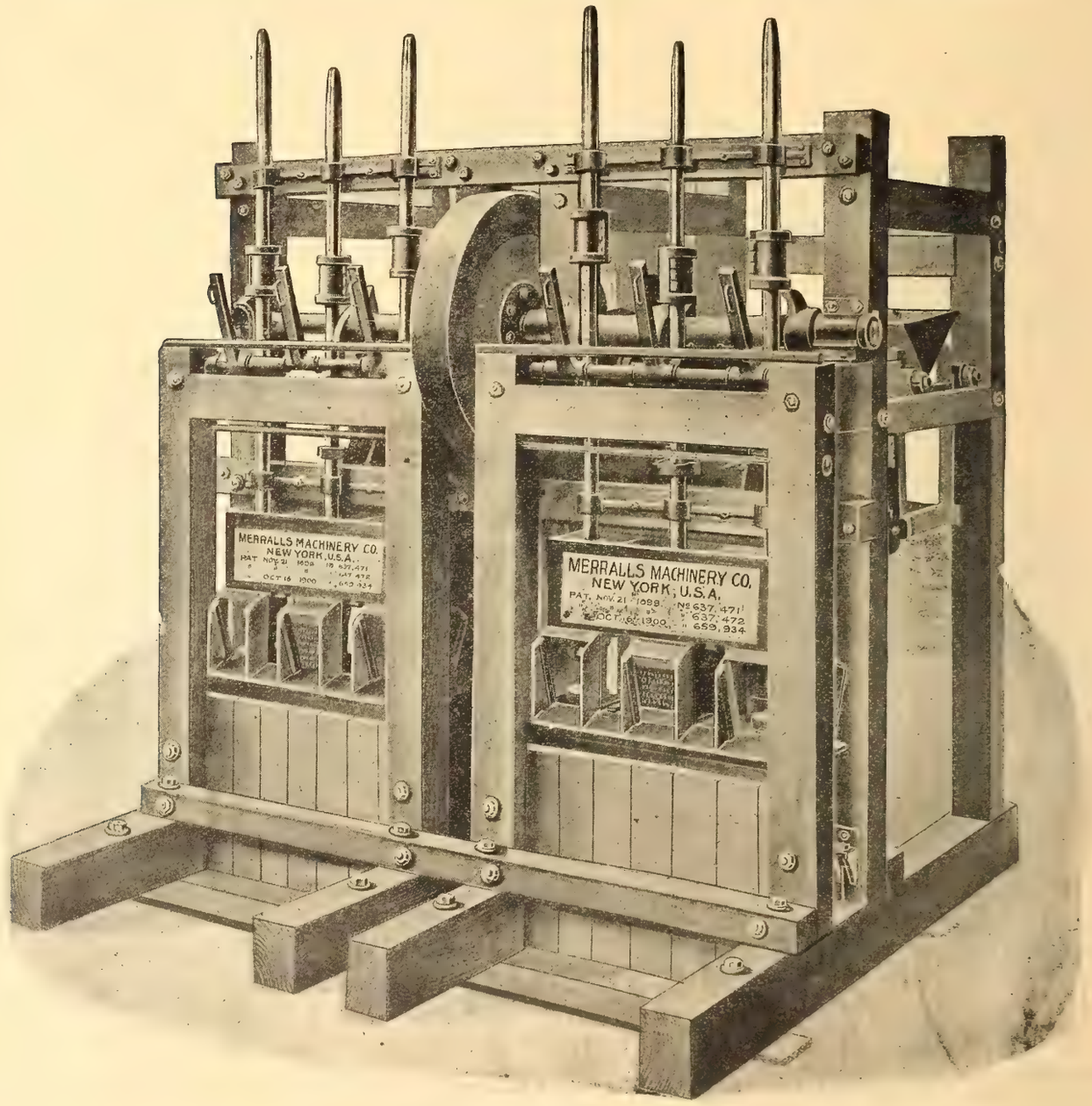

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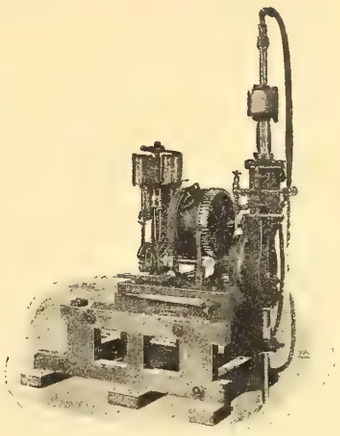

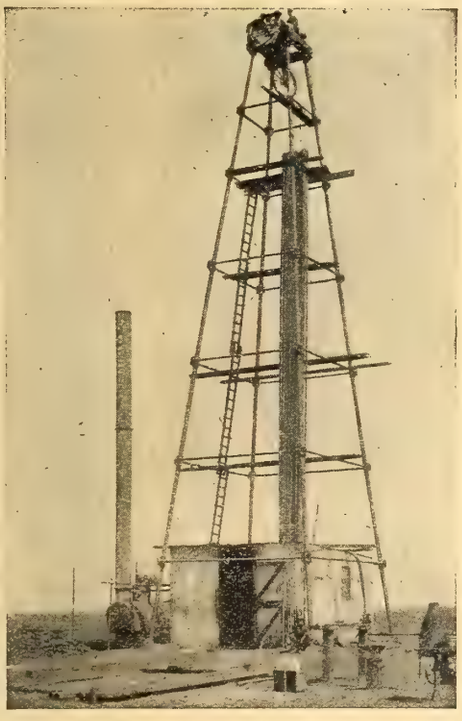

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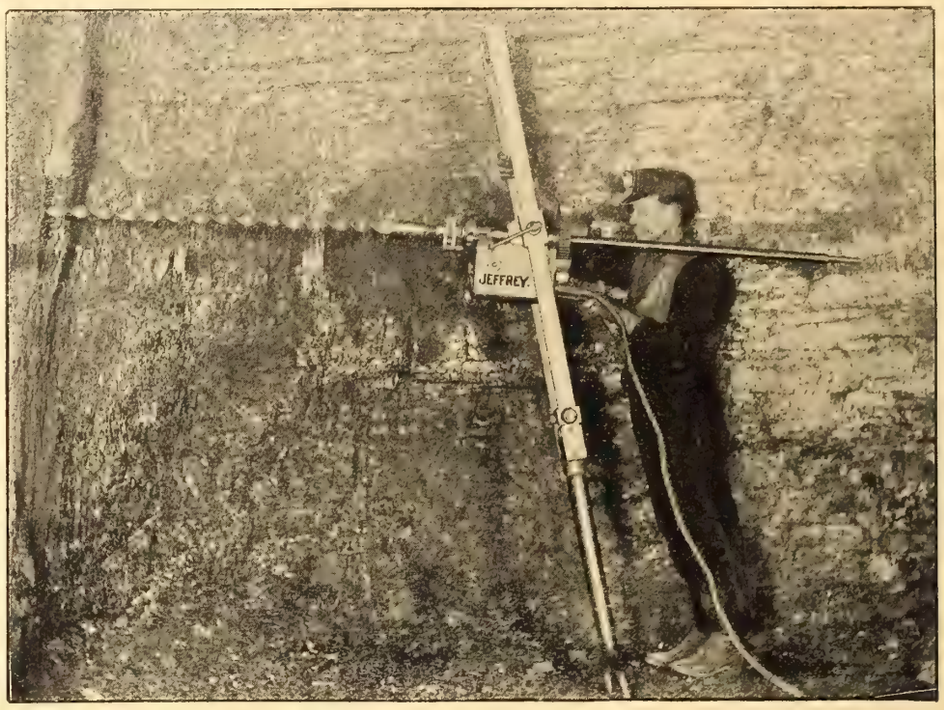

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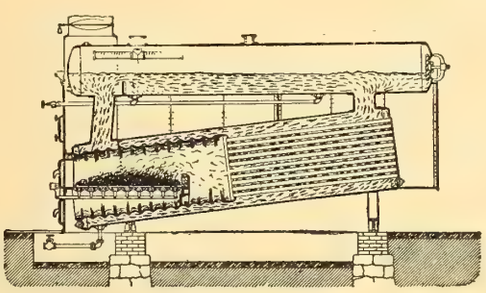

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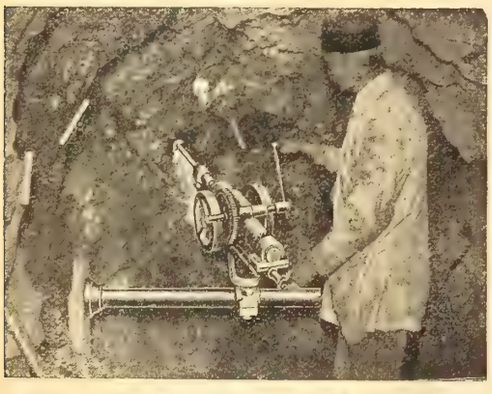

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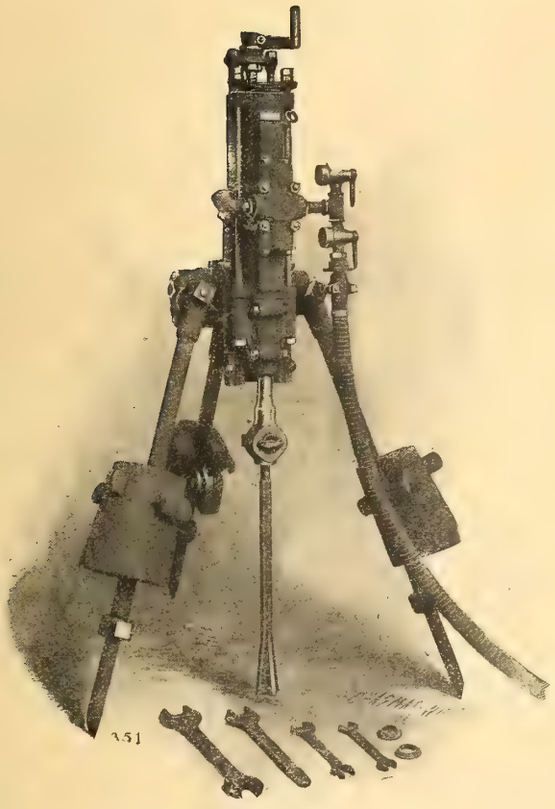

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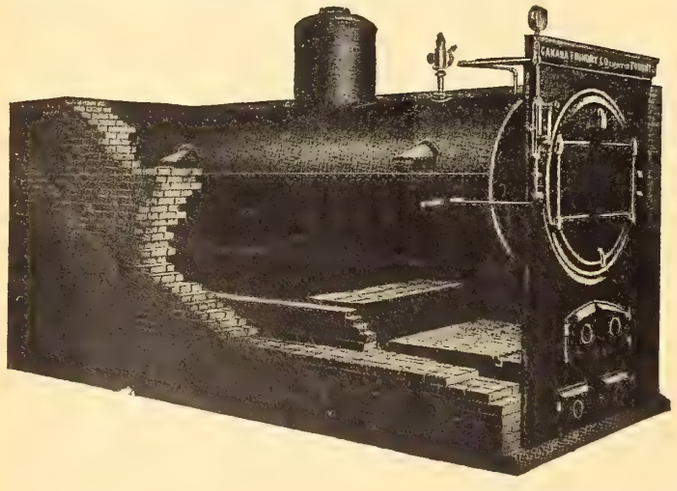

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With the next issue of the MINING REVIEW Mr. H. Mortimer-Lamb will assume the editorial chair, and Mr. J. E. Hardman, who has acted as editor since the death of Mr. Bell, will retire. Mr. Hardman's personal and professional interests demand more of his time than the position of editor allows, but he will remain as a special contributor to these columns.

The personality of the new editor requires no introduction to our readers. Mr. Lamb's extensive editorial experience and his able conduct of the British Columbia *Mining Record* have made him *persona grata* to the mining fraternity of Canada, and a large portion of the brotherhood in the United States and Great Britain. He will well maintain the previous character of the REVIEW as a free, outspoken and impartial exponent of Canada's mineral interests.

The news, to which we make editorial reference, of the closing down of the lead stacks in British Columbia, is far more serious than appears at first glance. In what way it may affect the corroding industry just established in Montreal is not yet clear, but the news is certainly discouraging if it is verified.

What the Dominion Government may think of an industry which requested a bounty, at the hands of important and representative Canadian citizens, on the ground that it only needed just a little and a temporary push on its way to enable it to travel far and successfully is an interesting pipe meditation.

In this case the amendment to the resolution appears to have been the gist of the matter. It will be remembered that Messrs. Blackstock, Drewry, *et al.*, of the St. Eugene Mining Company applied for an extension of the bounty to ores shipped abroad for treatment, and that sundry lengthy (and perhaps contentious) meetings were held by the silver-lead mine-owners at first to combat, but afterwards to approve of, the amendment. A settlement was reached by the St. Eugene Company agreeing to supply the balance of the amount needed to keep the lead stacks going, when it was permitted to export its surplus.

Facts in this issue show that out of 3,200 tons sold in March by the St. Eugene Co., only twenty per cent. went to the British Columbia smelters, while eighty per cent. of the production was shipped to Europe. Facts also show that the mine owners of the Slocan, incredible as it may sound, knew their own resources so little that their estimates of ore tonnage were ridiculously overstated. There is, perhaps, no remedy for a case of "false pretences" made before the Dominion Cabinet, but a second request for help to the Dominion Government is very likely to meet with the silence of contempt.

Until the expiration of the existing contracts between the St. Eugene Company and its foreign buyers there is little hope of the continued production of silver-lead bullion in the Kootenays, unless the situation is grossly misrepresented by the western press. Mr. J. J. Campbell is reported to be optimistic, having yet six weeks' supply for one furnace.

The London "Rialto" has published an interesting account of the dismissal of the libel action taken against the Ottawa "Journal."

"Mr. J. Carling Kelly is a gentleman of whom our readers have heard in the past. Early in last year we published certain articles concerning him, and from one of them an extract was reprinted by the Ottawa *Journal*. Against that paper Mr. Kelly, who is a Canadian, and who was one of the promoters of the Sapphire Corundum Company in this country, promptly commenced proceedings for libel. He also instituted similar proceedings in this country against ourselves. The action in the Canadian Court came on for hearing in due course, and in the result a verdict was given for the defendant newspaper, which has never yet been condemned in an action for libel. Kelly appealed, but failed again, and he has no further redress on the other side of the Atlantic."

The Lead Situation in British Columbia.

Advices from British Columbia, under date of the third instant, inform us that there is such a deficiency of lead ore at the present time as to occasion the closing down of the lead furnaces at both Nelson and Trail. The information we have received is to the effect that this is the result of the overestimation of the resources of the silver-lead mines in West Kootenay; there is no hint that there is any deficiency whatsoever in the great silver-lead mine of the country in East Kootenay.

The St. Eugene mine, under the contracts and agreements which were entered into some twelve months ago, undertook to supply any deficiency (up to a certain figure) which the home smelters needed, having the privilege of shipping abroad such amounts as were not needed by the local smelters. We are informed that the St. Eugene Company is keeping its agreement as to the specified amount to be sent to Trail and Nelson, but that this amount is not sufficient to keep both stacks in operation, and that a larger amount cannot be obtained from East Kootenay by reason of the big contracts it has entered into with European purchasers.

The REVIEW has known for some time the fact that, at the very period when the Government bounty was granted on lead ores, it was pretty well understood among the knowing ones that the lead properties of the Slocan had either been gutted of their lead ores, or that the silver values were gradually entering into the zinc blende of the mines, so that the zinc ores were the ones which carried the high silver values. Since that time there have been no fresh discoveries of new silver-lead bodies which have promised any tonnage, and the situation looks, at first glance, to be somewhat serious. Many of the old stand-bys in the Slocan country are either exhausted or closed down, or furnish principally zinciferous ore.

On top of, or perhaps, more correctly speaking, preceding, this public statement of the deficiency of lead ores, the *Sandon Standard* has recommended an agitation on smelter charges, and the matter has been taken up by one or two of the other papers in British Columbia, notably the *Nelson Tribune*. It seems to the REVIEW that the points made by the *Sandon Standard* are made without knowledge of the complete facts in the case, and which have been published during the last twelve months; but apart from that, and irrespective of any legitimate or illegitimate movement to obtain better rates for smelting, the closure of the lead stacks seems to us to point to the existence of other conditions than those having reference merely to smelter charges. If there *is* an actual deficiency of lead ore in the country, the question of smelter rates, bounties, or of Government "pap" is entirely apart from the solution of the problem.

British Columbia mining has had enough to stagger under during the last three years, owing to the apathy of the investing public, and the bad odor into which the whole province got, through the selfish misrepresentations and actions of the boomers who flourished from 1896 to 1901. The REVIEW is also insistent in taking the ground that any industry dependent for its existence upon the supply of Government aid, either in the shape of bounties or duties, had better be left to die a natural death, inasmuch as its prolonged existence is at the expense of the rest of the community, and inasmuch also as no amount of artificial feeding can make the infant strong and lusty. Personally, we do not think that the miners of British Columbia have ever given due recognition (certainly not publicly) to the enormous aid and assistance which their industries have received from the two smelting corporations which have met the miners more than half way for the last nine or ten years. In this respect the *Tribune* is perfectly correct in its reference to both the Trail and the Nelson smelters. C. P. R. directors have known, for many years, that the operation of the Trail furnaces *per se* were not profitable, and that the smelting corporation was kept alive through the advantages it offered to the transportation company. Shareholders, or even readers of the annual reports, of the Hall Mines, Limited, have known that the operations of the two stacks of that company were not attended with any dividends to the shareholders. We do not here deny some of the statements made by the *Sandon Standard*, but we are inclined to the opinion that such statements are not calculated to revive the industry, or to encourage the investment of new capital in the country.

British Columbia must work out its own salvation in the matter of its mines. Like all other mining countries of any prominence, it has experienced its period of boom at the hands of irresponsible adventurers, who have taken therefrom in a few years the legitimate profits of many years, and have left to their successors in the various corporations that have been formed only legacies in the shape of deficits, bad properties, and a generally offensive odor about all mining ventures in that country. Given a few years of wholesome living and good house-cleaning, and the disagreeable odor mentioned will have vanished, and the natural resources of the country be operated by men who are not interested in boomsters' yarns, but who insist upon looking at the matter without spectacles of either rosy or bluish hues, and who are willing to wait for the legitimate fruition of their hopes.

On the Discoveries of Cobalt-Silver Ores in Ontario.

In September, 1903, laborers on the line of the Temiscamingue and Northern Railway, which is under construction by the Ontario Government from North Bay to the Abitibi region, found mineral which they at first regarded as copper-bearing, but which was identified by the Bureau of Mines as smaltite. Mr. Willet G. Miller, the Provincial Geologist, visited the section in November of that year, and created no little excitement on his return by announcing in the public press that both native silver and rich cobalt ores had been found in place, and there was, in all probability, a somewhat extensive area in which similar deposits might be found.

In the spring of 1904 quite an influx of prospectors and mining men took place, resulting in the opening of half a dozen deposits, and the subsequent information has been favorable enough to induce the investment of considerable amounts of capital.

The bulk of the work which has been done has centered round what was formerly known as "Long Lake," which has been rechristened "Cobalt Lake." This lake lies about one-half mile south of the southern boundary of Bucke Township, and between Sassaganaga Lake and Pickerel Lake. The longitude is about 79 degrees 41 minutes west, and the latitude 47 degrees 23 minutes north. On the northwest side of the lake is the station of Cobalt, which is about five miles southwest of Haileybury.

The ore is essentially a smaltite, varying at times to niccolite by the substitution of nickel for cobalt, but the attraction of the region is the occurrence of silver, both in metallic form and as sulphides, which is associated with the cobalt-arsenic minerals. The metallic silver is, of course, secondary, and occurs in sheets, threads and minute nodules along both cleavage planes and interspersed with the smaltite and gangue.

The lateral extension of the veins or veinlets is masked by the heavy covering of soil or by the moss which grows thickly on bare rock surfaces in that latitude; the longest tracing yet made has not exceeded one mile. The vertical depth of the veins is also, as yet, indeterminate, the deepest shaft on March 1st having reached only 80 feet. The country rock is marked on the map as igneous, but there seem to be both igneous and stratified members in the district. The more probable solution appears to be that the strata of Silurian limestone and Huronian slates which appear to the northwest of Long Lake have been interlaminated or altered by lenses of agglomerate or ash rock, the volcanic ejectamenta of previous ages. The well banded slates at the bottom of some of the cliffs pass into breccia agglomerates at the top of the cliffs.

The veins are nearly vertical, and cut the slates and agglomerates at a low angle.

The principal operating properties at present are:

(1) The Trethewey.
(2) The Timmins.
(3) The McKinley-Darragh.
(4) The Earle.
(5) The Wright.

The Trethewey property consists of forty acres situated north of Cobalt Lake on lot J. B. 7. Up to the 1st of March, Mr. W. G. Trethewey, the owner, had shipped about seven carloads of ore, from which the return approximately was about $1,700 a ton.

The Timmins property was discovered by Messrs. Henry and Noah Timmins and David Dunlap, who have parted with the controlling interest to some other people. Some seven or eight cars have been shipped from this property, two of which were extraordinarily rich, averaging nearly $2,000 a ton. Locally, this property is believed to be the richest and best of the district. The Timmins property adjoins the Trethewey on the west.

The McKinley-Darragh property comprises lease 3401 at the south end of Cobalt Lake, and is a little less than forty acres in extent. Messrs. Anderson (of the J. R. Booth Co.) and Gorman, of Ottawa, are interested in the property, which has shipped about eighty tons of good ore. In working during this last winter the owners made an unfortunate miscalculation, and drove one of their tunnels through into the lake, letting in its waters and drowning that particular working. They are now stripping the surface from one or two places, and are making some open cuts in which they have a very fine showing of the vein, which, on inspection, reveals a very liberal sprinkling of metallic silver.

The Earle properties are held under the name of the "Nipissing Mining Co.," and comprise eight locations of forty acres each, or something over 300 acres in all, from which quite a number of shipments have been made of high grade ore. Local rumor has it that Mr. Earle represents the International Nickel Co., and that this company is acquiring all the valuable properties possible, with a view to enabling that corporation to effectually undersell the cobalt coming from New Caledonia.

The Wright property has been optioned to Messrs. Jacobs, Hersey et al, of Montreal, who have been working the property vigorously during the last five or six weeks, and now have a carload of very high grade ore ready for shipment. This property is located to the southeast of most of the other producing locations, being on lot 269, just south of Kerr Lake. Adjoining the Wright location to the east is a property in which the Messrs. Drummond, of Montreal, are also interested, and from which, as yet, no shipments have been made.

The general character of the ores are of the "poor man" order, the silver being massive near the surface and easily discerned by the eye without assay tests. Several geologists who have seen the district have expressed doubts as to the permanency of the silver contents, believing that these will diminish with depth. The experience of Mr. Trethewey appears to bear out these views, as the bulk of the silver values on J. B. 7 ceased at about forty feet in depth, but against this is to be placed the results of the workings on the Timmins property, which show no diminution in silver values with increase in depth.

The district is certainly one of interesting and unusual geological and mineralogical features. It strikes the inex-

perienced man at once as a perfect Eldorado, but the older man, experienced in native silver propositions, is inclined to look at the deposits as of a temporary nature, as far as the silver contents are concerned. But one, experienced or otherwise, cannot fail to realize that the section through which the Ontario and Northern Railway is now building is an exceptionally rich mineral country, and one which will add very greatly to the reputation of Ontario as a mining province.

Little has been said in the press about the discoveries of ore in the Temagami Lake section which lies, roughly speaking, about twenty-five miles southwest from this silver-cobalt region near Haileybury. In the Temagami Lake section deposits of auriferous pyrites have been leased from the Government, and are now being worked with prospects of great remuneration. These pyrrhotites of the region round the northeast arm of Temagami Lake also carry a very fair percentage of nickel, although not so large as the pyrrhotites of the Sudbury district. It is also probable that the region round Wahnapitae, which has been known for some years as a gold-bearing section, may also contain remunerative deposits of the precious metal. The whole country extending from Temiscamingue Lake southwesterly to Lake Wahnapitae, is a region of plutonic masses seamed and gashed with quartz and vein-filling materials which contain both gold and silver. The region is well worth the attention of prospectors, and indeed of capitalists, and the completion of the Government railway will afford access to the district in a better way than has been hitherto possible.

CORRESPONDENCE.

"The Percussive Theory."

To the Editor:

Sir:—Some little time since the writer noticed that one of your correspondents asked for information on this subject, and as he (the writer) has probably written more on this subject than any other mining engineer, he has pleasure in forwarding you the following information, to enable your correspondent to study it at his leisure, as the details would be too lengthy to quote in this letter.

The writer does not claim the priority of the suggestion of the applicability of this theory to colliery explosions, as it was first publicly mooted by Mr. Joseph Dickinson, retired Inspector of Mines, as an explanation of the unusual phenomena which were clearly demonstrated in the workings of the Udston Colliery after the explosion in 1887. The subject was not, however, followed up by Mr. Dickinson, and received only very scant attention from other engineers until 1902, when, during the enquiry into the explosion at the Mount Kembla coal mine, near Woollongong, in New South Wales, it was again brought into prominence. The evidence given at this enquiry conclusively proved that the origin of the explosion was a huge fall of rock roof in a large goaf, which caused such violent percussive effects on the air, that an explosion (of dust) occurred in one section of the mine, and resulted fatally to a large number of miners, directly and indirectly, and also demonstrated extraordinary effects on the mine itself. Dr. Robertson, the consulting engineer of the colliery company, and his co-experts, in their evidence, stated that the effects produced were entirely the result of sudden percussion of the air, which alone was responsible for the heat effects, and that in fact there was no explosion at all, in the sense in which the word "explosion" was generally applied to colliery disasters.

This argument was based on an article contributed by the present writer to the Colliery Guardian, entitled "Notes on the Talk o' th' Hill Explosion," which appeared without the author's name in the issue of that paper for the 21st of February, 1902.

Other references will be found in the writer's evidence before the Royal Commission on Explosions from Coal Dust, Q. 4634-4676; and in the following communications to the Colliery Guardian, viz.: "Some Effects Produced by the Sudden Compression of the Ventilating Air Current in Mines," Nov. 22nd, 1895; "Position of the Coal Dust Theory," June 12th and 26th, 1896; "Some Pressure Effects Shown by Colliery Explosions," Oct. 23rd, 1896; "Flameless Explosives and Coal Dust," July 5th, 1901; "The Coal Dust Problem," Jan. 10th, 1902; "Firedamp Explosions," April 25th, 1902; Correspondence in the Colliery Manager Journal, Jan. 10th, 1902; an article on the Senghenydd Explosions, Feb., 1902; in the Engineer, "Coal Mine Explosions," Feb. 12th, 1897; and in the Iron and Trades Review, Sept. 26th, 1902; "Damping the Air of Mines as a Safeguard Against Explosions," in Mines and Minerals, October, 1903; on "Spraying and Watering Problems," and in contributions to discussions in the Transactions of the North of England and Federated Institutes.

The Blue Book Reports on the Quarter, Udston, Tylorstown, Albion, Llanersh, Universal, Mount Kembla, Fernie and other Colliery explosions should also be carefully studied, as they give accounts of effects which indicated that the initiatory point of an explosion might be at two or more points, at very long distances apart. In the case of the Universal Colliery, it will be seen, on referring to the plans, that the experts were not in agreement as to the direction of the blast or blasts in several instances; one expert placed the origin of the explosion on the east side of the pit, whilst others were equally positive in placing it on the west side; but, without troubling to find which is the most probable, we have the evidence that the only man who escaped out of the pit alive was in the direct line of fire between the east and the west, and, therefore, if the flame of the explosion had actually traversed from one side to the other, he could not possibly have survived. If, however, we take the percussive theory into account, we can then imagine that the man being, so to speak, placed between two fires, was only exposed to pressure, and as this was not sufficient to kill him, it must have been reduced by his nearness to the pit shaft.

Students of "percussive" phenomena should also carefully study all recorded instances of explosions in air compressors or in their air receivers. In the majority of instances it will be found that the explosion occurred immediately after increasing the speed in answer to a demand for more air. At one time it was thought that two stage air compression would totally remove the risk of explosion, but a reference to the Iron and Coal Trades Review, for April 22nd, 1904, will show that even this mode of compression was not a safeguard.

Electrical investigators may possibly in time give us some material help in understanding percussive phenomena, thus—assuming that every atom of matter or gas has its own electron, and that a positive and negative electron form an ion, and also assuming that something occurs to separate

these electrons, and causes them to rush about (as a lecturer described it) looking for their own or fresh partners—what is the result? Percussion develops heat, and, if that heat is sufficient, flame also, and we may therefore aptly consider what forces of electricity are brought into play. The writer has heard it suggested that chemical union is really electrical union, but here the writer may get out of his depth, and must trust to some other investigator to clear up the mystery.

Yours faithfully,

JAMES ASHWORTH, M.E.

Highfield House, Chaddesden,
Derby, Eng., March 7th, 1905.

The Bed-Rock of the Gilbert River Gold Fields, Quebec.*

By JOHN A. DRESSER, M.A., St. Henri de Montreal, Que.

The gold hitherto produced in the Province of Quebec has been taken principally from the placer deposits of the Chaudiere basin in the County of Beauce. The important deposits have been found not in the valley of the Chaudiere itself, but along its tributaries, especially the Famine, Du Loup, Gilbert and Des Plantes. Of these, the Gilbert is probably the best known. All have been described at various times in the reports of the Geological Survey, particularly by Michel, Ells, and Chalmers.

It has been thought by all investigators, as far as could be ascertained, that the source of the gold is in the underlying rock, or in that of the immediate neighborhood. The bed-rock has been often described as noted for its decomposed condition and quartzose character, and in all cases has been considered to be an altered sediment.

Michel pointed out in 1866 that gold occurs in important amounts on the Gilbert, only within a quite definite area, and this opinion has been corroborated by the observation of subsequent workers. The extent of the gravels thus far known to produce gold, as pointed out to the writer last summer by Jerome Carillon, foreman of the Gilbert River Goldfields Co., coincides very closely with those indicated by Michel. Within this area, exposures of the bed-rock are rare. In the channel of the Gilbert River, however, near the Gilbert River Gold Mines post office, which is about the centre of this area, an accessible exposure occurs, and specimens of a similar rock are brought up from the deep diggings in which the gold is found. This rock is a variety of porphyry, a volcanic rock of the same class that underlies the gold-bearing gravels in Dudswell in the County of Wolfe, and which is the country rock of the well-known copper lodes at Eustis, Suffield and Capelton, in the township of Ascot, near Sherbrooke.

The latter is the rock of the mineralized belt which extends from Lake Memphremagog to Lake St. Francis, and includes the mines at Capelton, Eustis, Suffield and other parts of the township of Ascot, as well as portions of Stoke and Weedon. It has yielded the greater part of the copper thus far produced in the Province of Quebec. Similar rocks form a longer and larger area, known as the Sutton mountain belt, some twenty-five miles farther to the northwest, and also occupy a third large area along the boundary of the State of Maine, in the vicinity of Lake Megantic. The extent of the last mentioned occurrence is not yet at all definitely known. The volcanics in the Gilbert River area are thus some fifty miles northwest of those at Lake Megantic, and thirty miles northeast of the similar rocks of the Ascot belt at Lake St. Francis. The latter have hitherto been supposed to end at that point, but, from the agreement of the rocks of the Gilbert River in position, and also in petrographical character, with the rocks of the Ascot belt, they appear to be a continuation of that group.

The rocks of the Ascot and the Sutton belts belong to the porphyry-andesite series of volcanics, and seem to be frequently more acid in the vicinity of the copper deposits. They are in all cases extremely crushed, sheared and otherwise altered, and in consequence their original volcanic character has only recently been discovered. The ores which they contain are yellow, gray and purple copper, with green and blue carbonates. They frequently carry important amounts of gold, and, sometimes, of silver. Placer gold is also found in the gravels of many of the streams running over this rock, of which the best known are the Kingsley, Big Hollow, Rowe's, Willard's and Hall's Brooks on the south side of Stoke Mountain, in the township of Dudswell.

An interesting parallel to the relations of the gold-bearing to the other rocks, as presented on the Gilbert River, was pointed out to me by Mr. John Blue, manager at the Eustis Copper Mines. Here a hill, 700 feet high, is composed of a ridge of volcanic rock 500 feet in height, capped by 200 feet of sediments. Gold occurs along the little brook which runs down the hill near the mine, both in the gravel and in quartz veins, up to the limit of the volcanic rock, above which none has been found. This seems to represent in miniature the conditions at the Gilbert River.

The Capelton-Eustis properties were originally developed as a gold property, but the percentage of gold declined as lower levels were reached, while the amount of copper greatly increased. Yet gold is still a factor of appreciable value in many of these ores. It is also worthy of note that the gravels of the St. Francis River carry small amounts of gold between Lennoxville and Sherbrooke, and also at Melbourne. In the former locality the river crosses the copper-bearing volcanics of the Ascot belt, and at the latter, it crosses the Sutton band, which is of similar character, and receives the discharge of some smaller streams which flow over those rocks.

On the whole, the conclusion seems to be justifiable that the placer gold of southeastern Quebec may in all cases be derived from the same series of volcanic rocks that contains the principal copper deposits of the region. Hence, it would follow that alluvial gold in this region should be looked for only in localities underlain by these volcanics, or in lower parts of the valleys of the streams which traverse, or have traversed, them; and that it may occur in any part of the area occupied by these rocks in which the conditions have been favorable to the formation and preservation of placer deposits. The occurrence of gold seems, at all events, to be a reliable indication of the proximity of copper-bearing rocks, in this district.

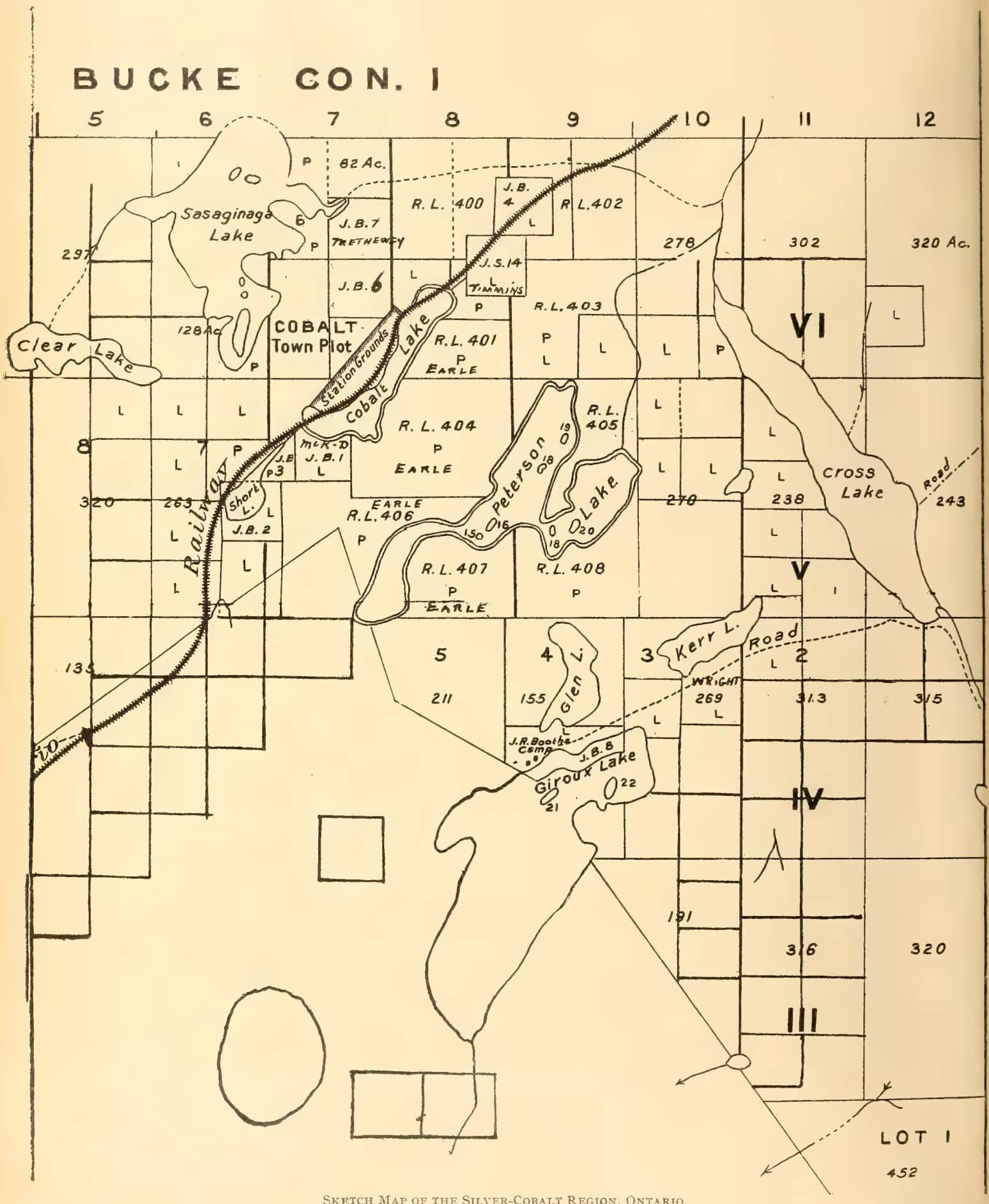
* Published by permission of the Acting-Director of the Geological Survey of Canada.

Uniform Mining Statistics in Canada.*

By EUGENE COSTE, E.M., Toronto.

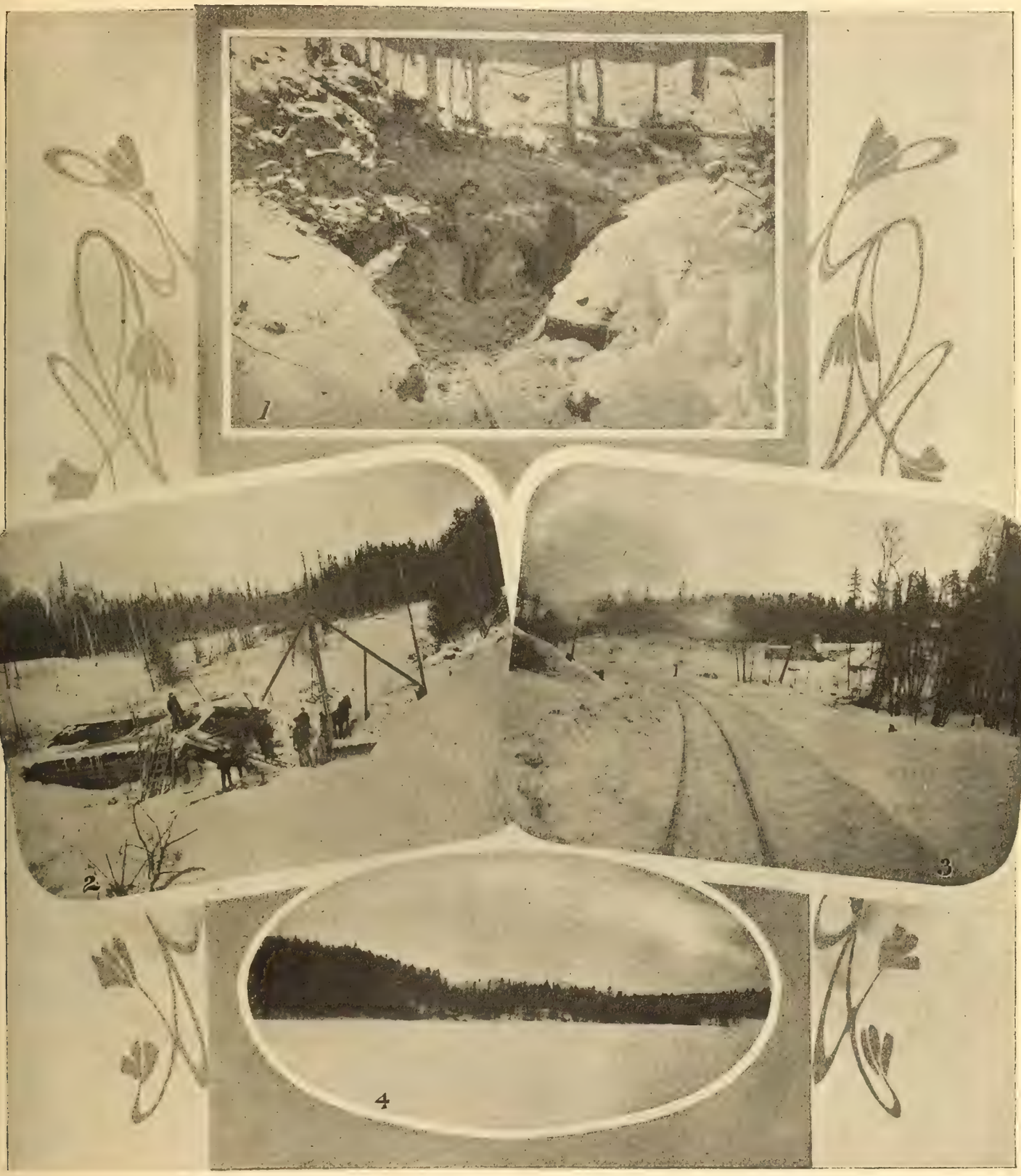
It is, I think, admitted by the members of this Institute that an annual uniform presentment of Mining Statistics by the Mining Bureaus of the different Provinces of Canada would be an immense step forward in the interests of the

* Read at the Montreal meeting of the Canadian Mining Institute, March, 1905.



SKETCH MAP OF THE SILVER-COBALT REGION, ONTARIO.

See descriptive article on page 69.



1. Cut on McKinley-Darragh Property.
2. Timmins Property.
3. View of Timmins Property from Ontario and Northern Railway.
4. View of McKinley-Darragh Property from Cobalt Station.

See descriptive article on page 69.

1. Trethewey's Vein.
2. View of Haileybury from Lake Temiscamingue.
3. New Liskeard Siding.
4. Nipissing Mining Company's Principal Pit, Earle.

See descriptive article on page 69.

1. Wright Property Cabin in the Woods.
2. Wright Property, Sacked Ore on Bank of Kerr Lake.
3. Wright Property, looking towards Kerr Lake.
4. Wright Property, showing Vein on Hanging Wall.

See descriptive article on page 69.

mining industries of the country. The Dominion Government could then readily publish annually through the mining division of the Geological Survey, or otherwise, complete uniform mining statistics of the whole country by simply adopting the uniform tables of the different provinces. A great deal would thus be gained, and nothing could possibly be lost.

For this most important reason, and for other reasons set forth in my short paper on this subject, which I had the honor to present to this Institute two years ago,* permit me to suggest the adoption of the annual publication by the Mining Bureaus of the different Provinces of the following two tables:

TABLE A.—MINERAL PRODUCTION.

In which the first marketed products of all mines, quarries and concentrating mills would be recorded by quantities valued at the places of production.

TABLE B.—MANUFACTURED PRODUCTS FROM MINERALS.

In which the quantities of metallic and other manufactured products from smelting, metallurgical, chemical or other works, would be recorded as finally produced and marketed at these works and with the value they are sold at, at these works.

A short correspondence between the heads of the different Mining Bureaus would soon establish the place for each mineral or manufactured product, whether in table A or table B, and we would then have the perfect uniform presentment so much desired, and which would be of so much value to us all and to the country.

I append below for illustration a list of the present annual products of Canada thus grouped in two tables, A and B, according to their more or less advanced state of manufacture, but, as I have said, the heads of the Mining Bureaus might conceive and agree on a better grouping of the products, and from time to time new products will, no doubt, have to be added to one or other of the tables, and it is quite possible of course that I may have omitted some of the products now being marketed in the country, and which complete mining statistics should cover.

TABLE A.—MINERAL PRODUCTION.

PRODUCT.

1. Actinolite.
2. Asbestos, different grades.
3. Asbestic.
4. Baryte.
5. Chromite.
6. Coal.
7. Corundum.
8. Feldspar.
9. Fire Clay.
10. Gold.
11. Granite.
12. Graphite.
13. Grindstone.
14. Limestone, for flux.
15. Gypsum.
16. Marls.
17. Mica.
18. Mineral Water.
19. Molybdenite.
20. Moulding Sand.
21. Natural Gas.
22. Ochre.
23. Ores of any metals, when sold as such.
24. Peat.
25. Petroleum, crude.
26. Phosphate.
27. Platinum.
28. Precious Stones.
29. Pyrites.
30. Salt.
31. Sands and Gravel.
32. Stones (all sorts).

* Journal of Canadian Mining Institute, Vol. 6, p. 408.

TABLE B.—MANUFACTURED PRODUCTS FROM MINERALS.

PRODUCT.

1. Aluminum.
2. Arsenic.
3. Bricks (all sorts).
4. Carbide, of Calcium.
5. Cement.
6. Coke.
7. Copper Matte.
8. Ferro-chrome.
9. Fertilizers.
10. Lead.
11. Lime.
12. Mattes or metal of any other mineral.
13. Nickel matte.
14. Nickel-steel.
15. Oils (refined).
    Illuminating Oil.
    Lubricating Oil.
    Benzine and Naptha.
    Gas, Fuel Oils and Tars.
    Paraffine and Wax Candles.
16. Pig Iron—
    From Canadian Ores.
    From Foreign Ores.
17. Pigments.
18. Quicksilver.
19. Pottery and Terra Cotta.
20. Phosphorus.
21. Sewer Pipe.
22. Steel.
23. Sulphuric Acid.
24. Tiles and Drains.
25. Zinc.

I suggest the annual publication of these two tables by the Mining Bureaus of the different provinces in addition to and independently of the way the statistics have been presented by these Bureaus in the past, as for the sake of comparisons, or for other very good reasons, it might be found desirable by these Bureaus to continue their annual presentation of other tables, with fine values "or otherwise," exactly as done before.

Bornite Ores of British Columbia and the Yukon Territory.*

By Wm. M. Brewer, M.E., Victoria, B.C.

The several occurrences of well defined contact deposits of bornite ore at various localities throughout western British Columbia and the Yukon Territory present many characteristics which make a study of them peculiarly interesting. These localities are very far distant one from the other, and up to the present time no continuity of the geological conditions from one camp to the next can be traced.

It would be entirely incorrect to describe the occurrences as occupying a belt or zone, because as a matter of fact the various camps in which this character of ore predominates are found entirely isolated from each other, but possessing very similar geological conditions, and especially is there a striking similarity in the matrix of the ore. So striking is this that it is impossible to distinguish with the eye any difference between much of the ore found on Texada Island from that on Gribbel Island, nearly 400 miles north from Texada and near the entrance of Gardner Channel, or for that matter that found in the White Horse Camp in the Yukon, over 1,000 miles distant from Texada or Vancouver Island, and vice versa.

Historical.

The first discovery reported in British Columbia of the indications that a body of bornite ore had occurred, was from Texada Island early in the nineties, but the news attracted but little attention, because of the ore occurring as impregnations disseminated through a felsite dike which was in contact with crystalline limestone, and having on the surface no well defined walls. The discovery was considered of but little value, and was turned down by miners and engineers generally.

* Read at the Montreal meeting of the Canadian Mining Institute, March, 1905.

This occurrence of ore was found near Marble Bay, on the eastern coast of Texada Island, on an old Crown-granted piece of land owned by Christie and Palmer, the former being the late well-known Toronto biscuit manufacturer, and the latter the president of the Toronto Type Foundry. These gentlemen showed their faith in the possibilities of the discovery by commencing mining operations on quite an extensive scale, which have been continued ever since until the ore body has been proven to maintain continuity from the surface to the present depth of the working shaft, about 500 feet, and the present owners, who purchased the property from Christie's estate after his death, about three years ago, have actually paid the purchase price, $200,000, from the profits of the ore mined, and are still shipping at the rate of 1,500 tons monthly.

Soon after the discovery of this class of ore near Marble Bay, another body, apparently entirely distinct, but only about half a mile distant, was found on Crown-granted land owned by a syndicate of Victoria business men. This property was floated as the Van Anda Copper and Gold Mining Company, with a $5,000,000 capitalization, sufficient in itself to sink it to the deepest depths of the ocean, but although owing to mistakes of the management, the company did get into financial difficulties, yet the fact stands forth prominently that the ore body has maintained its continuity in the Copper Queen Mine, to a proven depth of 680 feet, below which depth the shaft has not yet been sunk. The ore on all these properties on Texada Island has yielded excellent values in gold, silver and copper from the grass roots, roughly speaking, an average of about $15.00 per ton has been obtained, and several shipments of ore from between the 560 and 620 foot levels on the Copper Queen carried as high as $20.00 per ton in gold in addition to copper and silver values.

Later, other deposits of bornite ore were discovered about three miles distant, and towards the north end of the Island, but although much prospecting has been done since, it appears as though this character of ore was confined to the limited area bounded by the lines of these three properties, so far as Texada Island is concerned, and even in this limited area that occupied by the actual mining operations on known deposits is confined to four pieces of ground each less than 1,500 feet long by 600 feet wide.

The next discovery of bornite ore was made in 1898 in the mountains bordering on Sidney Inlet, on Vancouver Island, by two prospectors, Jones and Kincaid, and later, but during the same year, other discoveries were made in the same neighborhood by McKinnon and Shafer.

During 1899 McIntyre and Grainger, two Yukon pioneers, found ore of similar character near White Horse, the present terminus of the White Pass and Yukon Railway, and further prospecting has determined that such ore occurs at intervals along a zone about sixteen miles in length.

About the same time discoveries of a like character were made by prospectors from Whatcom County, State of Washington, on Gribbel Island, about 400 miles north-westerly from Vancouver.

During 1904 still another body of this ore was opened up by the Vancouver Island Development Company, under the management of Mr. Cecil, a pioneer mining man from Australia. This discovery is situated on the eastern side of Vancouver Island, about four miles westerly from the town of Ladysmith, and about two miles from the line of the Esquimalt and Nanaimo Railway Company.

These are all the discoveries of well defined bodies of bornite ore reported from the coast districts of British Columbia, but in the interior, in the Similkameen district, on Copper Mountain, very extensive deposits are found, and others of less extent on Ten Mile Creek, a tributary of the Nicola River. These occurrences in the interior though, bear a marked difference both with regard to the geological conditions surrounding them, and the matrix in which the ore occurs, to those on the island, and near White Horse.

Geology and Mineralogy.

With some slight local differences, which I will refer to later, the geological conditions under which the bornite ore occurs on the islands named (except the occurrence near Ladysmith), and in the White Horse Camp bear a striking similarity.

The oldest rocks are the limestones, but whether these belong to the Carboniferous or Cretaceous eras it is almost impossible to determine, because of having been rendered fully crystalline, therefore no fossils by which their exact age could be ascertained can be found. The late Dr. Dawson, in his reports on the geology of Canada, has classified them as probably belonging to the Cretaceous, thereby connecting them with the sandstones and conglomerates in which are found the coal seams belonging to that era, or, as the same authority says, some of the limestone possibly may belong to the Carboniferous age.

The sedimentary rocks were disturbed, and tilted up from their original horizontal position by the intrusion of masses and dikes of such eruptive rocks as diabase, diorite, granite, syenite and felsite, so that the dip of the limestone, especially at its contact with the igneous rocks, is almost vertical, and rarely less than at an angle of 28 degrees.

As an appendix to the report of the Minister of Mines for British Columbia, for 1903, the petrography of some of the eruptive rocks which occur as intrusions in the neighborhood where the bodies of bornite ore are situated on Texada Island is given. The samples were examined by Dr. Barlow, petrographer to the Canadian Geological Survey. They were taken from the Cornell Mine, and are described as follows:

"Felsite near shaft, second level—the ore-bearing matrix—the hand specimen shows a fine grained crystalline rock of greenish gray color, and earthy lustre. Under the microscope the rock has distinctly porphyritic structure, and from the mineral content is an augite porphyrite. Finely twined plagioclase, and colorless augite comprise the phenocrysts. The former occurs in tabular form while the latter is rather irregular. The base is in great part composed of augite, with which is associated turbid granular aggregates of epidote and calcite in the interstitial spaces. Pale brown garnet (almanditic) and colorless apatite are present as accessory constituents.

"Ore-bearing matrix.—The rock is a pale green granular pyroxenite, holding a large amount of accessory almandine garnet. Microscopically it consists principally of polygonal and rounded idiomorphic individuals of pyroxene. Saussuritized plagioclase and a pale brown garnet occupy angular spaces between the pyroxene individuals. The garnet shows well defined optical anomalies. This rock, from its association, is a deep-seated basic phase—possibly a segration of the augite porphyrite.

"Diabase porphyrite from second level.—The rock is fine-grained greenish in color, and has a somewhat sheared appearance. Under the microscope it is seen to be a much decomposed diabase porphyrite, and is evidently a deeper-seated portion of the magma. The plagioclase is probably near the basic end of the series. Its well developed zonal

structure shows a different composition for the interior and periphery, of which the former is the more basic and much saussuritized. The pyroxene has altered to a pale green pliochroic actinolite, with a separation of turbid epidote and a little calcite. Some irregular aggregates of brown biotite, numerous grains of magnetite and a few of apatite complete the section.

"Ore-bearing matrix, third level.—The non-metallic minerals composing the bornite matrix are pale green pyroxene and brown garnet. The microscopic section shows that the matrix is principally garnet—similar to that already described —with a subordinate amount of colorless augite. The garnet is much cracked, and these cracks are filled with the sulphides, chalcopyrite and bornite, and these are connected with the larger grains."

No microscopical examination, to my knowledge, has been made of any of the rocks found in other camps in which bodies of bornite have been discovered, but in almost every instance the matrix of the ore is identical with that occurring on the Cornell Claim, so that the above description given by Dr. Barlow, will, without doubt, apply to the same character of rock in other localities.

With the exception of the mineral claims situated near Ladysmith, those on Gribbel Island, and those in the Similkameen district in the interior of the mainland, limestone (fully crystalline), is always found as one wall of the ore bodies, usually it forms the foot wall. The ore bodies occur usually at the contact between this limestone and the so-called felsite, but sometimes between limestone and diabase, though this rarely occurs.

The diabase, syenite, granite and diorite which occur as intrusive masses and dikes, have apparently exercised no influence over the deposition of the ore bodies, in fact, in many cases, especially on Texada Island, it would appear as though many of these intrusions belonged to a more recent period than that in which the ore bodies were deposited, because some of the dikes are found to cut through the ore body, and by actual work it has been demonstrated that by driving through the dike the ore body is found on the opposite side.

In some instances, notably on the Arctic Chief mineral claim near White Horse, the matrix of the ore near the surface is magnetite and chlorite, but about 60 feet below, these minerals disappear, and garnetite is found as the gangue material.

It would appear as though the deposition of the bornite was due to replacement, for when it occurs at the contact of limestone and felsite there is no well defined wall on the felsite side, but instead, a gradual change from solid ore with a little felsite and garnetite to almost barren felsite and garnetite, with masses and crystals of bornite shot through those rocks irregularly, and from that to the barren rocks. On the 500 foot level of the Copper Queen mineral claim on Texada Island the crystalline limestone wall on the footwall side is nearly vertical; it is as well defined and regular as the wall of a house; next to it were four feet of solid bornite ore, then a gradual change to barren felsite and garnetite, next about eight feet in width of absolutely barren country, and beyond that a solid body of bornite, twelve feet wide in portions of the drift, then a well defined hanging wall almost vertical, composed of crystalline limestone slickensided.

On the Victoria mineral claim, near Ladysmith, the bodies of bornite occur in a matrix chiefly composed of silica in large crystals. The walls of these bodies are granite, the ore bodies themselves occurring as three distinct veins in a badly crushed zone of granite lying between well defined walls of massive granite flanked on the foot wall side by conglomerates and sandstones belonging to the Cretaceous coal measures. Limestone, either in its original sedimentary condition or altered to crystalline is entirely wanting, so far as I could see during a recent visit, when I made a partial survey of the ore bodies and the surrounding geology.

On Gribbel Island the bodies of bornite ore, so far as development at present shows, occur in a gangue composed of feldspar, garnetite and calcite, between walls of syenite schist, which close to the ore itself is very fine grained, and has been evidently subjected to great lateral pressure. Further removed from the ore body this rock becomes much coarser grained and has a more granitoid appearance, in fact, it is a question whether it should be classified as syenite or granite. A microscopical examination is necessary to settle the classification.

The crystals of feldspar, garnets and calcite in the matrix of the ore bodies on Gribbel Island are large and most beautiful specimens, the crystalization being almost perfect, and the coloring so delicate and lovely that it seems a great pity that the crystals are not hard enough to be used as gems.

So far as the ore bodies near Sidney Inlet, on Vancouver Island, are concerned, I am unable from personal observation to describe the geological conditions, but from several specimens of the ore which have come under my notice, I found that so far as the matrix is concerned it is practically identical with that of the ore on Texada Island. From descriptions which have been given me I am of the opinion that the geological conditions also are very similar.

In the White Horse Copper Camp the fact that while nearly every discovery made along the zone, in length about sixteen miles, and of variable width, has been a body of bornite ore overlaid by a shallow zone of copper carbonates, there are a few instances where the surface ore is unaltered chalcopyrite, occurring under practically the same geological conditions as do the bodies of bornite, and at about the same elevation, but in a zone which appears to lie parallel to that known as the main copper belt in which the bodies of bornite occur.

For several good reasons the development work in the White Horse Camp has been quite limited, and when I last visited that district in 1904 I found that only on one property (the Copper King) had the ore body been prospected to a depth exceeding 100 feet. The limestone footwall on which the ore lay had been followed down on its dip, and at a depth of about 126 feet the ore body exposed was solid chalcocite, which assayed close to 50 per cent. in copper. In the workings above, considerable chalcocite had been found mixed with the bornite, but at no point had the ore body been entirely composed of chalcocite until the depth mentioned was reached.

The highest grade copper ore that has ever been shipped from British Columbia mines in any quantity came from the Copper King during the fall of 1900 when a sample shipment of 8½ tons, which was sent to the Everett Smelter in the State of Washington, yielded 46.6 per cent. in copper.

Another feature peculiar to the ore deposits in the White Horse Camp is that quite frequently pockets of molybdenite ore occur associated with the bornite ore, and still another feature is that very frequently tremolite occurs as a gangue or matrix in addition to garnetite and felsite.

The geological conditions surrounding the deposits of bornite on Copper Mountain in the Similkameen District are entirely dissimilar to those in any of the other districts referred to in this paper. In fact the occurrence of ore bodies themselves bear a striking dissimilarity, for instead of the ore bodies being lenses of variable extent of solid ore in a

garnetite or felsite matrix, they are very extensive bodies of diabase with masses and grains of bornite disseminated through the rock with great regularity and to such an extent as to give a value of an average of about 5 per cent. copper to the ton through a width of upwards of 100 feet and beyond that limit to an undetermined width. This fact has been actually demonstrated by development work on the Sunset Mine on which much more extensive operations have been carried on than on any other prospect on the mountain.

One of the chief reasons for my having noticed particularly the several occurrences of bornite ore in the camps referred to in this paper, is that these bodies are isolated, but in near proximity occur zones or belts of considerable extent in which are found deposits of chalcopyrite, pyrrhotite and magnetite. On Texada Island there also occurs veins of gold-bearing quartz, which are free milling at the surface and for a shallow depth below. In the White Horse Camp though, so far as at present known, there are only those bodies of chalcopyrite to which reference has already been made.

The geological conditions which surround the occurrences of bornite ore are to some extent dissimilar to those which surround the other sulphide ores mentioned, except in the White Horse Camp. For instance, on Vancouver and Texada Island the felsite dikes which occur as intrusions and closely associated with the bornite ores, are wanting in the proximity of the occurrences of the other sulphide ores, which almost invariably occur, either in fissures in the diorite or diabase country rock or else as contact deposits between those rocks and crystalline limestone.

For this reason the theory, I believe, is warranted that the felsite has had a greater influence over the deposition of the bornite ores than have had any of the other igneous rocks, for even where other rocks are found as wall rocks there is always evidence of the presence of felsite in the matrix, and besides this fact, except in the Similkameen country, the line of demarkation between the ore and any wall rock except the felsite is not only clearly defined but invaribly there is a gouge of talcose material of variable thickness, very rarely less than one inch and sometimes several inches, between the ore body and the wall, but this is always wanting when felsite forms one or other of the walls. I regret that because of constant travelling I have had no opportunity to make more thorough research with regard to the deposition of the bornite ore, and also regret that time will not permit me in this paper to more fully describe the various occurrences and call attention to other characteristics which I have noticed.

Canadian Metallurgical Products for the Far East.*

By FREDK. HOBART, Assoc. Editor, *The Engineering and Mining Journal.*

It is hardly fair to dignify by the title of a paper what is, at best, intended to convey a few suggestions; and some of them are not new. The mineral production of Canada is increasing on certain lines, and now needs, or will soon need outlets for the surplus over domestic consumption. It seems to me that Canadian producers can do better than to look entirely to Europe and the United States for such an outlet, especially as the Pacific Coast of the Dominion is the section where the surplus is most likely to exist.

The Far East,—China, Japan and India,—is the region where new markets are to be found to the best advantage. China is a consumer on a considerable scale; the country possesses mineral resources but they are imperfectly known and have been developed, if at all, in a very limited and imperfect way.

We can hardly gauge the actual consumption of metals, owing to the absence of all reliable statistics, but the imports or purchases of foreign material can be ascertained. Japan is different: there, the metals are mined and treated in a modern and intelligent way. The resources are limited, however, and the country cannot supply its own needs with the sole exception of copper. India is not a mining country. In spite of its vast extent the mining and metallurgical output is insignificant, and the needs of its people must be supplied from abroad.

One of the more important of the metal products of Western Canada is lead, and there is complaint of an insufficient market. Canadian lead is shut out of the United States by a high duty and of Europe by the long railroad haul to the Atlantic seaboard. Now from the best attainable information, China and Japan buy yearly from 35,000 to 40,000 tons of lead. To this, India adds 10,000 or 15,000 tons more. Much Canadian lead has already gone to the East; but there is no reason why a great deal more should not be sent.

The chief competition to be met with here is from mines of the Broken Hill group in New South Wales. They have been favoured by the proximity of Sydney to the Chinese ports, but the bounty now paid on Canadian lead ought to compensate for the difference in freight rates.

Lead prices in the East are governed by the London market, but Canadian lead is ruled by the same market if sent to Europe, and the chances are that it would bring a better return if sent across the Pacific.

During the past half year Chinese merchants have been large buyers of copper in New York. In part this demand has been due to the extra demand caused by the Russian war, which has absorbed much of the metal which Japan formerly sold to China; but in part it is certainly due to an increase in consumption in China itself, the cause and extent of which we are not yet able to determine, though there is no doubt that it exists.

I have seen recently copper from the Lake Superior mines, shipped from Houghton directly to Hong Kong, by way of Seattle, requiring rail transportation across half the continent, with its attendant charges.

British Columbia is getting to be a large copper producer. Why should not copper from the Boundary District, from Vancouver Island, or from Rossland, go to China, when it has to pay little more than the ocean rates ?

When our zealous member, Mr. Gardé, succeeds in establishing a zinc smelter in British Columbia—which I hope he will do—there is little doubt that a market for some of his spelter can be found across the Pacific. Brass and bronze are in large use in Japan and China and there is little zinc ore known in either country.

A great hope for future Trans-Pacific trade is to be found in the possible building up of an iron industry in British Columbia. Canada has then what the United States does not possess on the Pacific Coast—iron ores and fuel suitable for metallurgical work. Across the Pacific are countries which buy iron and steel and will continue to buy it; China, because of lack of mine development and of metallurgical skill; Japan, because the country is deficient in iron ores. Moreover, the loss of the market in Manchuria and Korea, which was threatened by Russian domination, seems likely to be averted. There is a great prize waiting in the Far East for American iron-

* Read at the Montreal meeting of the Canadian Mining Institute, March, 1905.

makers, and the advantage will be with those who can locate themselves on the western coast of the continent. It is even possible that they can compete with the British, German, and Belgian mills, which now supply India.

Australia is also a large market for iron and steel, and all efforts to establish iron manufacture there have failed, thus far, owing to a combination of circumstances, which is likely to limit production in the future also.

These are only suggestions, and have, as I said before, doubtless occurred to others also, so that I do not pretend to claim originality for them. They resolve themselves all into a simple sentence.

The Far East needs metals; why should not Canada have its share in supplying the demand ?

Rock and Ore-Crushing Machinery.

Within the past few years the Hadfield Steel Foundry Co., Ltd., of Sheffield, England, has gone quite extensively into the matter of constructing stone and ore-crushing machinery, and has enlarged its works for this purpose. The result has been not alone the improvement of details in the design of various types of crushing machines, but also in the application of alloys and metals which have not hitherto been employed. The research work of the managing director of the company, Mr. R. A. Hadfield, and his modifications of different processes, has resulted in cast steel being now very extensively employed in places where formerly cast iron was used. The saving is not alone in weight, but also in the greatly increased strength of the parts. The particular brand of manganese steel known as the "Era," introduced by Mr. Hadfield in other connections, has been utilized for liners, jaw-faces, and teeth for crushing-rolls. The consequent reduction in weight is important, as a crushing plant is always required to be of a portable nature, and in any case has frequently to be sent to countries where railway facilities are limited.

We publish an illustration of the Hadfield and Jack patent "Heclon" gyratory breaker, in the design of which there are several important departures. In all other machines of this type the crushing-head, or cone, is fixed on a solid shaft, and the downward thrust is taken at the lower end of the shaft. This is objectionable, because the shaft is supported where the motion is the greatest, and there is set up a frictional resistance which develops considerable heat, and this interferes with smoothness of working, and adds to the power which is necessary for driving. Usually the conditions are such that dust finds its way into the eccentric. In the Hadfield patent the central shaft is hollow, and its bearing is at the upper end, where motion is practically nothing; the fact that the hollow shaft fits over the outside of the eccentric results in all dust and dirt being effectually excluded. It is also hardly necessary to point out that, with the hollow shaft, there is less likelihood of invisible flaws, so that this important piece of the crushing plant is likely to be more reliable.

As shown in the figure, the "Heclon" breaker consists of a body portion constructed of cast iron, with a base plate of the same material, and a diaphragm running in a diagonal direction for the passage of the broken material. The upper portion of the body is made of cast steel

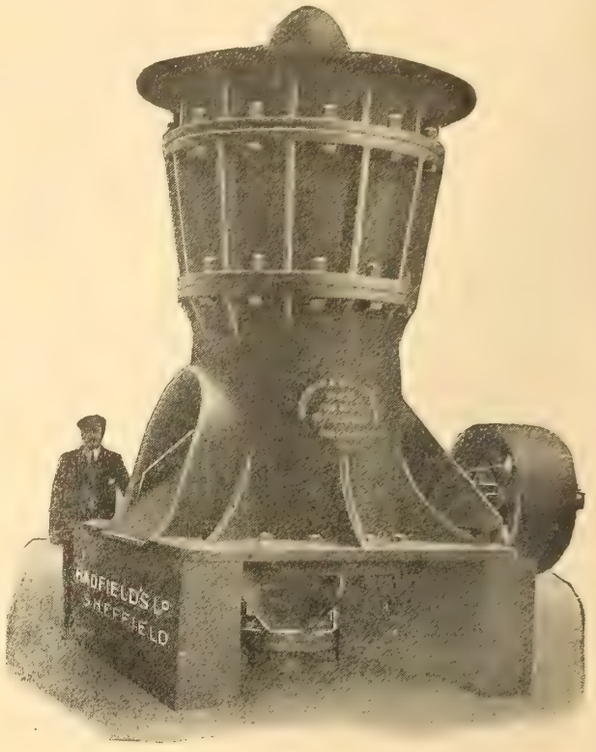


Fig. 1.

lined with "Era" manganese steel concave ribbed plates; above this a cast-steel hopper is securely attached by bolts. In this hopper is formed a three-legged spider connecting with, and supporting, the boss. The conical head forming the breaker is carried on the hollow steel shaft, and the arrangement of the operating gear is an interesting feature in the design. The shaft does not revolve this head, the motion given being purely oscillatory or gyratory, and such rotation as may occur in prac-

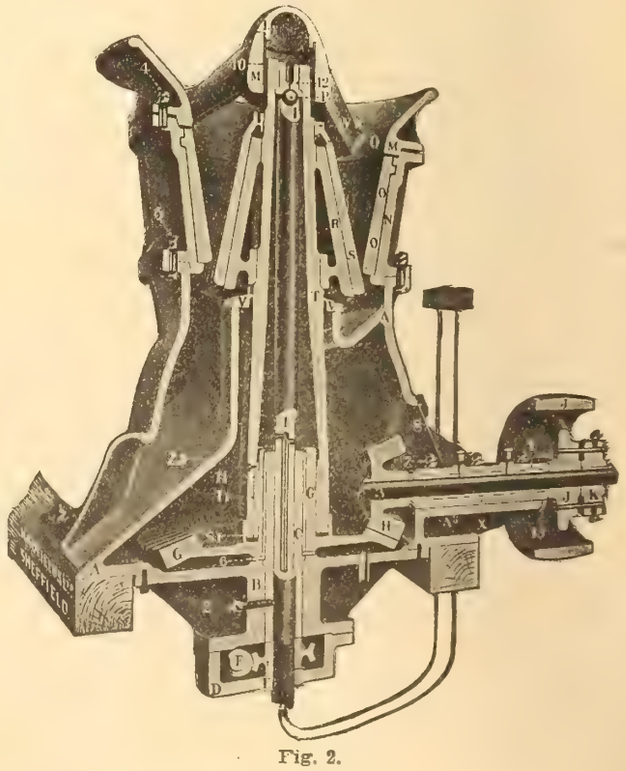


Fig. 2.

tice is entirely due to friction of the stone or ore between the head and the concave plates. The head has an outer mantle of "Era" manganese steel. The oscillatory motion is transmitted to the shaft and thence to the conical head by means of an eccentric boss cast on the

base gear-wheel, which latter is operated by a bevel-pinion on the horizontal shaft, as shown. There is securely attached to the base plate a steel shaft marked A, which takes the thrust from the eccentric boss of the wheel B. The eccentric boss on the bevel-wheel works inside the hollow steel shaft C. Anti-friction metal bushes are placed between the shaft A and the inner surface of the eccentric boss, and also between the outer surface of the eccentric boss and the inner surface of the hollow shaft, in such a manner that they can be easily taken out to be examined when necessary. The weight of the hollow shaft is carried on a special bronze ball at the top, where, as we have already said, the motion is practically nil. The degree of fineness to which the material is crushed can be regulated by winding the centre shaft D up or down through the medium of the worm and worm-wheel, shown at the lower end of the shaft.

The eccentric bearing requires careful lubrication, and the manufacturers make it a special point that only the best oil shall be used for this purpose. The method of supplying oil to the eccentric is important. A constant supply passes over the inner and outer bushes, the oil being fed from a box some feet above the level of the main bearing through two small tubes. The oil from the bearing finds its way partly under the dust-cap E and partly past the inner bearing down to the base-plate, whence it drops through the small pipe F into a receptacle whence it is recovered for filtration and subsequent use.

To secure absolute freedom from dust in the main eccentric bearings a cast-steel ring E is placed outside the hollow shaft resting on the boss of the horizontal wheel. As this ring is constantly lubricated with oil, in the manner already referred to, there is no possibility of dust finding its way into the bearings through this channel. To prevent dust or light particles getting down into the gear from the crusher-head, another dust-collar, G, is provided at the base of the head; this rests on a projecting trunk which runs up from the inclined diaphragm in the body of the machine. The machine is driven by means of a belt and pulley, shown in the figure. This drives through the medium of safety breaking-pins and a bevel-pinion geared to the horizontal bevel-wheel B. A very long bearing is provided for this shaft, which is lined with anti-friction metal. Those parts of the machine which are subject to abrasion have renewable liners of "Era" manganese steel. The inclined diaphragm and the arms of the spider are also protected by thin cast sheets of this metal. Great care has been paid to secure absolute metallic contact in respect to the mantle over the cone; the inner surface is coated with a hard white alloy, which can be made perfectly smooth and regular so as to insure a close fit on the head.

The Hadfield Company have manufactured ten of these gyroscopic breakers of the largest size for the Premier (Transvaal) Diamond Mines, Limited. They will be used for breaking the blue ground carrying the diamonds preparatory to its further reduction by large crushing rollers. This is one of the largest single orders yet placed for crushers, the combined capacity of the ten machines being in excess of 1,000 tons per hour.

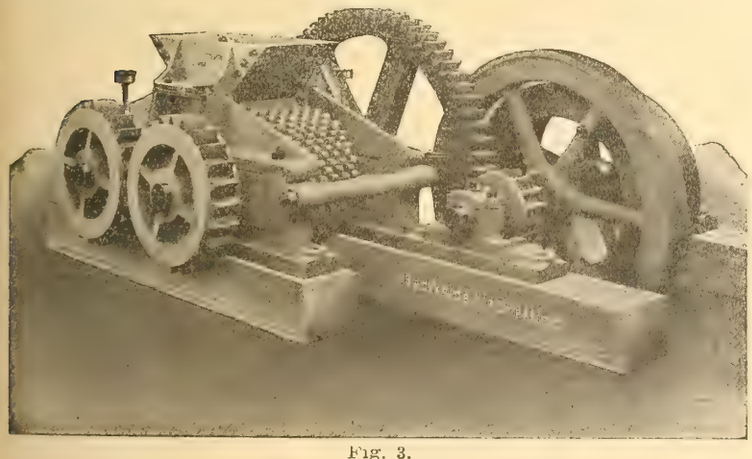


Fig. 3.

Figure 3 illustrates a type of roll crusher now largely used for breaking partly crushed material. The machine is gear-driven and is intended to receive the flat spalls or slivers in macadam-making plants, and to reduce the same to cubical product. The special feature again in this machine is the improvement in the metal used in construction. The rolls are strengthened by the use of cast steel, where hitherto cast iron has been used, and the side frames are entirely of steel castings. The rolls themselves are provided with renewable shells of "Era" manganese steel. The illustration shows toothed rolls, for which the "Era" manganese steel is particularly satisfactory, as this metal enables the teeth to be made longer and of a form more satisfactory for crushing. Prior to the introduction of the "Era" manganese steel, chilled cast iron was the only metal sufficiently hard to resist the wear, but, as it lacked toughness, the teeth had to be made either very heavy or very short. With "Era" manganese steel it is possible to adopt longer teeth, and thus give longer life to the roll shells.

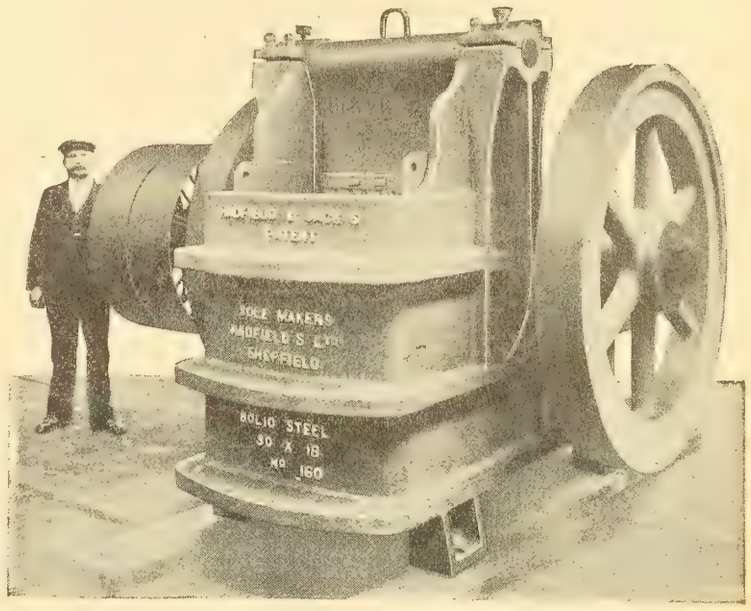
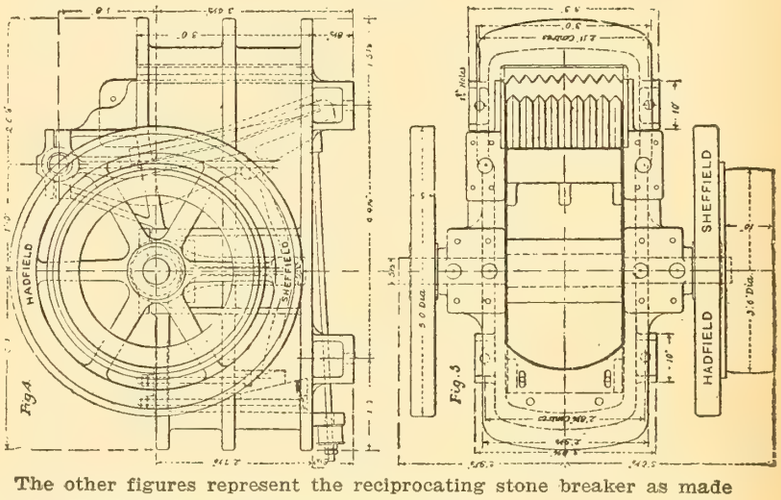


Fig. 6.



The other figures represent the reciprocating stone breaker as made by the Hadfield Company, and which has also been improved by the introduction of the special metals already spoken of. The body is made of cast steel, the stiffness being imparted by ribs, as shown in the figure. The "pitman" and swinging jaw-stock are also made of cast steel, and, showing a reduction of weight, lessen somewhat the motive power required. The toothed front of the jaw-face (as shown in the cut) is of "Era" manganese steel, while the back has V-grooves to reduce the amount of metal required. These grooves are filled with a special mixture of hard spelter, the surface being left perfectly true, so as to give a satisfactory contact with the steel, of which the main frame and jaw-stock are made. Jaw-faces thus made can safely be reduced in weight to one-quarter of the weight necessary when chilled iron is used. This arrangement also facilitates transport and repair, and decreases somewhat the overall dimensions of the machine. All toggle-plates and toggle-bearings are also made of "Era" manganese steel. This class of crusher is made by the firm in eight sizes, ranging up to 30 in. by 18 in., as shown in Fig. 6.

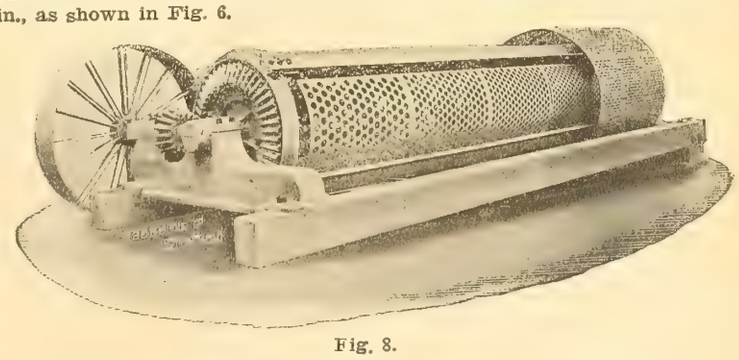
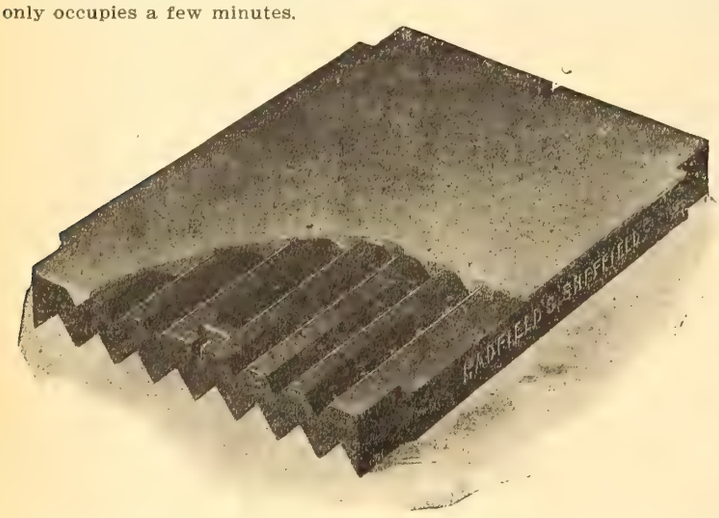


Fig. 8.

Fig. 8 illustrates a special type of revolving screen designed by the Hadfield Company, the main purpose of which is to prevent rapid wear. The screen is formed of steel, and is supported on friction bearers at

one end, and on trunnion bearings at the other, so that the whole of the interior is free for the passage of stone, there being no spider arms or other projections. The perforated plates are held in place simply by four angle-bars, running from end to end; they are not, therefore, bolted or riveted in position. Where the bar comes in contact with the screen, thin strips of "Era" manganese steel are bolted to it for protection against the action of broken stones. Each barrel, of different mesh, is not connected circumferentially to its neighbour, but is simply held in position by the grip of the four angle-bars. In the machine shown there is an outside ring for fine sifting. The arrangement is such that, while the screens are of durable metal, they can be instantly removed by unscrewing the bolt securing the angle-bars,—an operation which only occupies a few minutes.



Messrs. Hadfield are also manufacturing elevators and conveyors, and are using "Era" manganese steel for the links, pins, sprocket wheels, and other parts subject to great wear and abrasive action. They have made a large extension of their machine-shops for dealing exclusively with crushing machinery, conveyors, etc.; and the illustration below gives a view of one of the two bays devoted to this work. It accommodates a very complete installation of machine tools, the special feature, perhaps, being the large amount of grinding which is undertaken in connection with the application of "Era" manganese steel to the working parts of the machines. All the tools are driven by electric power. The illustration shows the erecting-shop, and suggests by the number of gyrating crushers, reciprocating machines, and screens, as well as conveyors, the extensive character of the production of the Hadfield Company in this new branch. It may be added that the well-known firm of gold-mining machinery makers, Messrs. Fraser & Chalmers, have adopted Hadfield's jaw-crushers and "Heclon" gyratory breakers for all their South African requirements.

The Hadfield Steel Foundry Co., Ltd., are among our valued advertisers and should do a satisfactory business through their Canadian agents, Messrs. Peacock Bros., of Montreal.

PERSONALS.

Mr. F. J. Thorpe, chemist to the Canadian Copper Co., has resigned his position.

C. J. Coll, manager of the Acadia Coal Co., has gone to England on a business trip. He will return about May 15th.

Mr. David Stewart, has been appointed assistant to general manager Cowans, of the Cumberland Coal and Railway Co.

Mr. H. L. Frank, president of the Canadian American Coal Co., has returned to Butte after spending some time at the mines.

Mr. R. E. Harris, the well known K.C., of Halifax, has been elected to the presidency of the Nova Scotia Steel & Coal Co. in succession to the late John F. Stairs.

Mr. John H. Plummer, president of the Dominion Iron & Steel Co., has much improved in health, and expects to be able to leave his sick room for a trip to France within a few weeks.

Mr. Alex. Dick, the general sales agent of the Dominion Iron & Steel Company, has been giving instruction and entertainment to the people of Sydney by a lecture on Scandinavia, with which he is well acquainted.

Mr. Horace Mayhew and Mrs. Mayhew arrived in Halifax on April 7th, on their way to Cape Breton. Mr. Mayhew is the president of the Cape Breton Coal, Iron and Railway Company, which is opening collieries at Broughton, C.B.

Mr. G. H. Duggan, 3rd vice-president of the Dominion Coal Co., was recently in Montreal in conference with President Jas. Ross. It is rumored that Mr. Duggan has been offered the general managership of the Mexican Light, Heat and Power Co. in Mexico City.

Mr. R. E. Chambers, manager of the Wabana Mines of the N.S. Steel and Coal Co., has gone to Cuba to look into the matter of leasing iron lands for the company. He is accompanied by two experienced subordinates whom he will leave in charge of exploratory work.

Mr. S. W. Gebo, of Frank, Alberta, has resigned from the management of the Canadian American Coal Co. and accepted the management of a coal property at Lewiston, Montana. Mr. Gebo is the pioneer coal operator of the Blairmore field, having been identified with the Frank Coal Company since its inception.

BOOK NOTICES.

Lake Superior Copper Mines.

The editor of the Daily Mining Gazette, of Houghton, Mich., has compiled a very interesting pamphlet, detailing the developments in the copper mining industries of Lake Superior during 1904. Mr. A. L. Carnahan begins at the south western end of the Keeweenaw peninsula and (seriatim) enumerates the properties at which operations have been active during that year. The first mine mentioned is the "Bohemian," and the last "The Copper Crown." The pamphlet is most valuable to shareholders and to those specially interested in the metal.

The Investigation of Mine Air.

Messrs. Charles Griffin & Co., Ltd., London, have just brought out a neat volume on this topic which embraces four papers by well known authorities on the subject of mine air.

Dr. Otto Brunck, of Freiberg, introduces the matter by a concise and well illustrated paper on the analysis of mine air by simple methods. M. Léon Poussigne, of the Ronchamp collieries, follows with a paper on the measurement of air currents and estimation of fire damp at his collieries by a method little known outside of France. Dr. Haldane has a valuable paper on the examination of the air in mines, and his chapter on "Interpretation of Mine Air Analyses," which forms the bulk of his paper, supplies a want long felt by chemists who have the knowledge to make the analyses, but rarely the experience to interpret them. The final chapter is contributed by the late Sir Clement Le Neve Foster, and deals with the effects of the carbonic oxide which was liberated at the Snaeffel Mine, in Wales, in May, 1897.

The editor is Dr. J. S. Haldane, who has done his work faithfully and well.

Ohio State Bulletins.

The State of Ohio has published recently three interesting bulletins dealing with the work of the topographical and geological surveys. The topographical mining is described by Mr. C. E. Sherman, inspector, while the geological branch is represented by Bulletins No. 2 and No. 3 on the use and manufacture of cement. The latter Bulletin (No. 3) is really a handbook, so complete and authoritative are its contents.

Department of Mines, Nova Scotia.

The Annual Report of the Department of Mines of Nova Scotia has grown very much in bulk during the last half dozen years, reaching for 1904 about two hundred pages. We are glad to also be able to say that it has also very much improved in quality and interest. The introduction of line drawings and illustrations has made the reports more valuable to professional men, and more understandable by the miner. If there is a point upon which criticism may be expressed it is that the inspection reports are too much in the nature of mere catalogues of what has been done, and too chary of comment upon the same. Upon this question, however, there may be a diversity of opinion as to the property of governmental criticism, but there should be no question as to the value of such criticism to the province. The supplementary papers of Mr. D'Arcy Weatherbee, the Engineer of the Department, lend additional interest and are of value.

Manual of Mining.

Messrs. John Wiley & Sons, New York, have brought out a fourth edition of Magnus C. Ihlseng's "Manual of Mining," which has about 150 pp. and 75 illustrations more than the third edition. Four editions in fourteen years is not a bad criterion by which to estimate the value of a technical work, and we wish that we could say that the quality of the publisher's work had kept pace with the demand from the reader. But in looking carefully through the work, the antiquity and worn character of some of the illustrative cuts is only too apparent; this is more particularly noted in those illustrations which have been used in catalogues of mining machinery manufacturers.

In Part II., which occupies 193 pp. out of 737, "Practical Mining" is considered, and the bulk of this part is accredited to Mr. E. B. Wilson. As a "Manual—for Students and Mining Men," it is noticeable that there is no chapter nor reference to methods of alluvial mining, hydraulicing or dredging, with which the western United States are so much concerned. It is an omission which is a serious one, in view of the title of the book.

The bulk of the work, some 400 pages, is really devoted to the engineering portion of mining work, the methods of generating and utilizing power for the various necessities of rock mines, and as such is a most valuable book for the young engineer. For the more experienced engineer it is worthy of a place in his library for reference, but it will not be used as much as other books which should be on his shelves.

The Mechanical Engineering of Collieries.

The Colliery Guardian Co., of London, have published in book form the articles on mechanical engineering of collieries, by J. Campbell Futers, which have already appeared serially in the columns of that paper. The present book, which is Volume I., contains the chapters on Boring, Sinking, Surface Plant, Headgears and Shafts, which have been printed, and the chapters now appearing on Winding, Heapsteads, Screening and Washing will constitute Volume II. It is proposed to include the subjects of Pumping, Haulage, Coking, Locomotives, Railways, Shipping Machinery, Electricity, Boilers, etc., etc., in the additional volumes which are promised by Mr. Futers.

The work is an endeavor to rewrite and bring up to date the late Mr. C. M. Percy's work on the same subject. The presswork, cuts, type, etc., of this volume is most excellent, reflecting great credit on the capacity of the printers (The Chichester Press), and the price asked, seven shillings and sixpence per volume, equivalent to $1.80, is remarkably low for so thoroughly illustrated a book. The difference in the quality of the work between this volume and Mr. M. C. Ihlseng's Manual of Mining is noteworthy.

INDUSTRIAL NOTES.

The Dominion Coal Company recently placed an order with Allis-Chalmers-Bullock, Limited, Montreal, for eleven New Ingersoll Coal Cutters. The company had already 175 of these machines in operation.

The Sullivan Machinery Company, of Chicago, announces the establishment of a new branch office in Salt Lake City, Utah, Room 128, Keith Building, Mr. John C. Taylor, formerly of the Denver office, manager.

The South Side Elevated Railway Company, of Chicago, has contracted with the Westinghouse Electric & Manufacturing Company for complete equipments for seventy cars, which includes one hundred and forty 75 h.p. motors, and multiple control apparatus. The motors are of special design and are in line with the re-equipment of this system. The cars will be operated in trains of five, three of which will be motor cars.

The Allis-Chalmers-Bullock Co., of Montreal, have issued a new catalogue (No. 81) of rock drills and mining machinery built in Canada by that firm. The typographical work is of a most excellent quality, and the contents valuable to the practising engineer and purchaser. Each year notes improvements in trade catalogues, until now such literature constitutes one of the assets of an engineer's library; this catalogue is in every way worthy of a place in such a library.

The authorities of McGill University, Montreal, are aware of the importance of keeping their students in the Science Courses informed upon the latest advances in the manufacturing world. For that purpose the leading specialists in different branches are invited from time to time to address the students. Mr. H. A. Burson, B.A.,Sc., Chief Electrical Engineer of Allis-Chalmers-Bullock, Limited, has just completed a series of addresses upon Induction Motors, of which the Company makes a specialty.

The Wellman-Seaver-Morgan Company, with main office and works at Cleveland, Ohio, announces that Mr. Geo. B. Damon, who has been manager of their New York office, has been transferred to an important position in connection with the Engineering and Sales Department at Cleveland, Ohio, and that Mr. W. A. Stadelman, for the past ten years manager of the eastern office of The Brown Hoisting Machinery Company, has become the manager of the general eastern office of The Wellman-Seaver-Morgan Company, with offices at No. 42 Broadway, New York City.

The Westinghouse Electric and Manufacturing Company have recently had the following orders: The Alliance Machine Company and the Morgan Engineering Company, both of Alliance, Ohio, last week placed orders for a total of 120 crane motors with an aggregate of 2,000 horse-power. They vary in size from 1 to 100 horse-power. The Pennsylvania Railroad Company on the same day contracted for 20 induction motors to be added to their present motor equipment, and the Bethlehem Steel Company entered an order for direct current motors to be used in their mills.

The Morris Machine Co. has issued its 1905 catalogue. This well-established corporation has had for forty years an enviable reputation for the quality of its pumping machinery and engines. Its works at Baldwinsville, New York, cover a very large extent of ground, and every machine sent out is guaranteed by a guarantee which has value behind it. Of special interest to the mining fraternity are the horizontal centrifugal pumps for high lifts, and the dredging pumps for handling sands and gravel, auriferous or otherwise. The catalogue is recommended to engineers having need of pumps.

The number of orders received by the Westinghouse companies for steam turbines and turbo-generators is convincing evidence of the firm belief which engineers place in this class of apparatus as a source of power.

Three of these outfits have recently been ordered by the Public Service Corporation of New Jersey, one having an output of 500 kw., and two with ratings of 1,000 kw. each. There is also a 1,000 kw. turbo-generator building for the Indian Orchard Company, and a 400 h.p induction motor with starting device, and two 300 kw. transformers. Westinghouse, Church, Kerr & Company are the designers and engineers for this station.

The Canadian Rand Drill Company has favored the Review with its catalogue C on air and gas compressors, which is, like the Allis-Chalmers-Bullock publication, worthy of place in every engineer's library. This booklet on compressors epitomizes a treatise on the compression of gases, and the construction of the machine, which is most valuable for ready reference. The matters of valves, both inlet and outlet for air, the gear for the same, of frames, intercoolers, and governors are clearly dealt with. There is also an exceedingly clear and valuable chapter on foundations for air compressors and on their erection. A chapter which will be of value to our Western friends deals with the question of air compression at great altitudes, a matter of which many engineers are heedless. The get-up of the book is most creditable, and it will be furnished to any engineer upon request to S. W. Duggan, advertising manager, Montreal.

The Allis-Chalmers-Bullock Co., of Montreal, have recently built and put into successful operation at Maisonneuve the largest frequency changer ever built. This is to transform the current sent to Montreal by the Shawinigan Water & Power Company, as the current from the Shawinigan Falls is a 30 cycle current, and it is necessary to change this to 60 cycles for the use of the city. The total length of the frequency changer is 30 feet, and the motor and generator each stand 15 feet high; the total weight is half a million pounds, the motor and generator together have 30 poles, which have a gross weight of 48,000 pounds, and revolve 300 revolutions per minute. The work of erecting this heavy machinery was entrusted to Mr. Thos. J. Mullin, the Constructing Superintendent of Allis-Chalmers-Bullock, Limited, and the total time consumed was only thirty-one days.

Mining Share Market.

The only mining shares for which there is any demand are St. Eugene, Canadian Gold Fields Syndicate, Centre Star and War Eagle. The two former are being quietly bought on the reported good showing being made by the first, and many people think the position of the two latter will be improved after the amalgamation with the Le Roi companies.

Industrials continue active, and all show gains. Prospects for these companies are bright, the money market is easy, and speculation on the increase.

The following list shows the quotations for the week ending Monday, April 17th, as supplied to the Review by **Robert Meredith & Co., 57 St. Francois Xavier Street, Montreal:**

Par value of shares		Asked.	Bid.
.10	Canadian Gold Fields Syndicate	.05¼	.05
5.00	Cariboo Hydraulic	—	—
1.00	Centre Star	.23½	.22
1.00	Deer Trail Consolidated	.02	—
1.00	Giant	.03½	.01
10.00	Granby Consolidated	6.50	6.00
10.00	Montreal and Boston	1.00	.87½
1.00	North Star	.02	—
1.00	Payne	.02	.01
1.00	Rambler Cariboo	.15	.12
1.00	Republic	.03½	—
1.00	St. Eugene	.48	.47
1.00	War Eagle	.13	.12
1.00	White Bear	.04	.—
100.00	Nova Scotia Steel (common)	64.50	64.25
100.00	Ditto ditto (preferred)	—	—
100.00	Dominion Coal (common)	80.50	79.25
100.00	Ditto ditto (preferred)	—	—
100.00	Dominion Iron and Steel (common)	24.25	24.00
100.00	Ditto ditto ditto (preferred)	69.50	69.00
——	Ditto ditto ditto (bonds)	85.75	85.25

MINING NOTES.

NOVA SCOTIA.

The March shipments from the collieries of the Cumberland Railway and Coal Company at Springhill, N.S., amounted to 37,443 tons.

The yield of the Nova Scotia and Mexican Co., operating in Sherbrooke district, was $3,568 for the month of February.

The temporary troubles at Springhill, which at first threatened to be serious, have been satisfactorily adjusted by manager J. R. Cowans.

The Dominion Coal Co. will double-shift No. 5 colliery, and probably two others, this month in order to increase the output.

The Joggins mine and property, sold last month to Mr. Stuart Jenks, is to be reorganized and reopened.

The blast furnace at Londonderry which was blown out for repairs on March 8th is to go in blast again on May 1st.

The price paid for the Coxheath copper mines, sold in March to Joseph A. Gillies, was $30,000. Over $200,000 had been expended on the property by the old Coxheath Copper Co.

The Dominion Iron and Steel Company have submitted tenders to the Intercolonial Railway for 10,000 tons of steel rails, which will be required during this year.

The Royal Oak Mining Co., of Goldenville, N.S., produced 288 ounces of gold, valued at $5,472, from 615 tons during January and February, an average return of about $9.00 per ton.

Several large tourist parties are to visit Cape Breton this summer, being attracted by the tremendous increase in business which has facilitated conveniences for travelling.

The offering of new stock in the Robb Engineering Co., in Nova Scotia, has been very largely over subscribed. Shares in this company are a preferred investment among Nova Scotians.

Negotiations are under way with the Standard Chemical Co., of Toronto, for the establishment of a branch of that concern in Halifax to manufacture wood alcohol, acetate of lime, creosote, etc.

Springhill, N.S., reports that on the night of March 30th, thousands of small fish (minnows) were found in the snow on the Park, and ascribes the occurrence to a cloud coming from southern seas.

The Dominion Coal Co. began its shipments to the St. Lawrence, through the port of Portland, Me., and the Grand Trunk Railway, on the 23rd of March with the SS. Louisburg, which carried 2,100 tons.

The district of Seal Harbour, near Isaac's Harbour, in Guysboro' County, is experiencing renewed interest. A lode, locally called "Donkins," has been uncovered, which shows a width of 16 feet, and a payable value.

The Nova Scotia legislature has struck out from the bill regarding the transfer of the Joggins mine a clause providing that arrears of wages to workmen, amounting to $5,000, shall be a lien on the property under its new owners.

Mr. Alex. Dick, general sales agent of the Dominion Coal Co., reports prospects for the year 1905 as very promising, the demand is strong and prices are good. The season opens April 15th and the large fleet of steamers will be very busy until close of navigation.

The iron deposits of the Nictaux region, round Torbrook, N.S., are receiving attention from both the Londonderry Iron Co. and the Nova Scotia Steel and Coal Co., both of which corporations have men in the field prospecting the ground upon which they hold options.

The billet mill of the Dominion Iron & Steel Co. closed down on the 23rd of March for a week to make repairs to the foundation which had settled out of line. The business of the company is steadily increasing, and there is no doubt as to the steady output of rails beginning with June 1st.

The Nova Scotia Steel and Coal Co. are putting in a double-decked cage at No. 1 colliery, and are making additions to the plant at other collieries with the intention of raising 650,000 tons of coal during 1905. This would be an increase of nearly fifty per cent. over the output of 1904. The market and conditions justify the expectations of the management.

The Nova Scotia Steel and Coal Company will remove some of the blast furnaces at Trenton to North Sydney during the summer, but there will be no curtailment of the steel capacity at Trenton. The move is dictated for reasons of economy in handling the iron ore from Newfoundland, and in anticipation of the large increase in business which is steadily coming in.

The Cape Breton Coal, Iron and Railway Company is pushing work at the Broughton colliery. Two large compressors have arrived from Walker Bros., of Wigan, England, and two Capell fans. The foundations for the batteries of Babcock & Wilcox boilers are down, and houses are erecting for the workmen. The steel bankhead and revolving tipplers are being put in by a Pittsburg firm. The mine is working double shift, and two slopes are being opened.

Dominion No. 3 colliery closed on April 1st for two weeks to make improvements on the plant. The colliery will resume again on April 17th. The haulage is to be extended for 400 feet, the bankhead is to be lowered ten feet and a new haulage engine is being installed. New roads are also being railed, and a new picking belt and weigh scales will be put in. The new equipment will provide for an output of 1,800 tons a day, which, in view of the long haulage system at that colliery, will be a large output.

The Sydney Cement Company, with a capital of $500,000, has selected ground for the site of its works close to the Dominion Iron and Steel Company's blast furnaces. The proposal is to make cement from iron slag. Mr. C. J. Curtis, of New York, has received the contract for the construction works, and has already broken ground; under contract conditions the plant is to be finished by August 1st. The rated capacity is 500 bbls. a day. The company has been granted exemption from local taxes, and a bonus of $10,000 by the City of Sydney.

The March output of the Dominion Coal Co. was as follows :—

Dominion	No. 1.	33,277 tons.
"	No. 2.	65,850 "
"	No. 3.	21,748 "
"	No. 4.	45,081 "
"	No. 5.	46,552 "
"	No. 7.	8,565 "
"	No. 8.	7,692 "
	Total	228,765 "

NEW BRUNSWICK.

At a shareholders' meeting, held at Moncton on the 6th of April, the sale of the property of the Petroleum Oil Co. to an English syndicate was confirmed. The capital of the new company will be £650,000, of which £168,000 (in shares) will be paid for the property and £200,000 put in the treasury for development; of this £200,000, £100,000 is to be sold at once for cash working capital. The sum of $50,000 in cash has been put up as a forfeit.

QUEBEC.

Mr. Peter McKenzie, of the McKenzie Trading Co., left about March 25th, with a force of twenty-five men, to begin mining work on Lake Chibougamoo, in northern Quebec. Mr. McKenzie took in a complete outfit for prospecting and assaying, and is accompanied by his sons, one of whom is a competent assayer.

ONTARIO.

The Grace mine has completed the installation of its plant.

The Canadian Copper Co. has appointed Mr. George Silvester to the position of chief engineer.

The Copper Cliff equipment is to be supplied with current from the Huronian Co., at High Falls.

The Honor Bright Company, in the Eagle River district, has let a contract for the development of its property.

The matte shipments of the Canadian Copper Company for March were the largest in the history of the company.

Mr. M. A. Meyers has offered to compromise, or settle the suit of Charles Bollensen by returning Mr. Bollensen's notes.

During the month of February the United States received from Ontario mines 64,506 pounds of copper and 54 tons of ore.

The Eldorado mine of the Northern Light Mining Co., reports the discovery of an additional body of high grade ore at the 138 foot level.

The Creighton mine is to be equipped with a new machinery plant, all of which is to be driven by electric power supplied from turbine.

The Canadian Northern Coal and Ore Dock Co., Ltd., has been incorporated to do a general coal trade, transportation, lumber and grain business.

The new boiler for the Little Master property on Summit Lake has been successfully transported from Wabigoon across the ice to its destination. It weighed six tons.

The Soo Company is now turning out daily over five hundred tons of rails. The largest output of any one day was during the first week in April, when the amount reached 567 tons.

The new manager of the Black Eagle mine on the Lake of the Woods is Mr. C. E. Hilary, who is not to be confused with Mr. N. T. Hilary, of Sudbury. Both are Englishmen.

Mr. D. D. Mann is authority for the statement that the James Bay Railway will be completed to Parry Sound by the first of September, and will be in Sudbury by the first of January, 1906.

Mr. Adams Dawson of the Canadian Copper Company, who has had charge of the construction work at Turbine, where the new power houses are located, has completed that work and returned to Copper Cliff.

Construction work on the coal dock of MacKenzie & Mann, located between Fort William and Port Arthur, has begun and the dock will be completed by September. The capacity of the dock will be about 200,000 tons of coal.

The Trethewey property on J. B. 7 in the new Cobalt-Silver district, recently afforded a mass of metallic silver weighing 80 lbs., of which 700 ozs. are metallic silver worth $350. The mass measures 25 inches by 12 inches by 2 inches.

The No. 2 mine of the Canadian Copper Co., after being closed for two years, has again been opened, and is now being equipped with electric machinery for pumping and hoisting. The allotted capacity of the mine has been put at 300 tons per diem.

The Union Drawn Steel Co., of Beaver Falls, Pa., has established a branch works at Hamilton. The branch has been incorporated under Canadian laws and will have a capital of $150,000. It will operate under the name of the "Canadian Drawn Steel Co."

The Sultana mine continues its weekly shipments of bullion to the Imperial Bank at Rat Portage. The clean up for the week ending April 1st amounted to 126 ounces. This sum was obtained from quartz met with in development and no stoping is, as yet, doing.

Rumours are stronger every day that the United States Steel Corporation will locate a plant somewhere in Ontario. The position of the works will be either on Lake Erie or on the Detroit River. Both Sarnia and Port Colborne are mentioned as likely places.

Reports from the Canadian Northern Railway state that plans for the iron furnace at Port Arthur are being prepared by Chicago engineers. It is expected that work of construction will shortly begin, and as soon as that starts the deposits at Atikokan will be opened up.

The Baden-Powell property, owned by the Northern Light Mining Co. has recently had a stamp mill erected on its property. Air compressors have also been installed, and the company propose to push work vigorously as soon as the damage occasioned by the recent fire has been repaired.

A deputation of gentlemen interested in the new Temiscamingue country and headed by Major R. G. Leckie, of Sudbury, waited on Premier Whitney last week to request that East Nipissing be created a mining district, that better enforcement of the mining regulations might be had.

The Laurentian mine in the Manitou district is to have a summer road, and be independent of water communication. The 20-stamp mill on the 20th Century property is to be moved to the Laurentian. The Laurentian is on H W 371, about one mile from the town of Gold Rock on Manitou Lake.

An Italian employed by the Massey Station Mining Co., Ltd., was recently killed in an inexplainable manner. He was working on the fourth level, but in some way unknown he fell into the skip road and dropped a distance of eighty feet. His body was wedged between the skip and the foot wall, and after its recovery death ensued.

Messrs. McKenzie & Mann have purchased from Messrs. Bolckow, Vaughan & Co., of Middlesboro, England, 20,000 tons of rail for delivery to the James Bay Railway. The delivery is to begin in May. The reason assigned for this importation is that the Canadian mills rolling rails are unable to supply on such short delivery notice.

The district round Eagle Lake will have considerable activity this season. The Baden-Powell property, which suffered the loss of its mine buildings through fire in February, has rebuilt the structures and will resume sinking. The Eldorado mine will install a compressed air plant, and the Pioneer Island mine will sink by contract work.

The Rathbun Co., of Deseronto, Ont., is selling out its various branches in Ontario. This company for years has been one of the largest marketers of American coal and has done a very large and profitable business. The object is stated to be, not retrenchment but devotion to the larger interests of the company in their iron and steel works, cement plants and transportation companies.

The extension of the Ontario Northern Railway to the north towards Lake Abittibi is attended with fresh discoveries of rich ores near Tom's Town, the end of construction at the present time, which is about twenty-five miles north of Haileybury; a deposit of cobalt-silver has been met, and to the east of this town, a distance of about seven miles from it, marcasite richly impregnated with gold is reported.

An echo of the old Bullion Mining Company, promoted some six or seven years ago in Montreal and Toronto by the Honourable Robert Rogers, has been noted in a judgment recently given out by Justice Teetzel. The company brought action against Sir Richard Cartwright on a bill of exchange accepted by the defendant, but the Justice dismissed the claim on the ground that the second company formed from the first incorporation had never worked the mine, and that, therefore, there was no real consideration for the amount paid.

The annual report of the Bureau of Mines was presented to the Ontario Legislature on Friday, the 7th inst. From it are taken the following figures.

The total value of the metallic production for 1904 was $5,321,677; of the non-metallic production, $6,665,970. The metallic production was as follows :—

Gold	$40,000
Silver	111,887
Platinum	10,452
Palladium	18,564
Cobalt	36,620
Copper	297,126
Nickel	1,516,747
Iron (ore)	273,068
Iron (pig)	1,811,664
Steel	1,188,349
Lead (ore)	11,000
Lead (pig)	2,500
Zinc (ore)	3,700
	$5,321,677

BRITISH COLUMBIA.

The Providence mine has cut the vein on the 400 feet level.

The Golconda in Dearwood Camp has started operations.

It is reported in Slocan Lake that the old Galena Farm property is to be reopened.

Mr. W. S. McDonald has resumed work on the Moonshine claim, near Anaconda.

The output of the Boundary mines for the first quarter of 1905 was 225,000 tons of ore.

The total shipments from Rossland for the first quarter of the present year amounted to 88,026 tons.

The Granby Company is now charging four furnaces by the aid of the new automatic electrical charger.

The trail to the Spy Glass property is still blocked, and operations cannot be resumed until it is opened.

The shipment records for the week ending March 25th, were the largest in the history of the Boundary district.

The winze from the ninth level in the Centre Star has encountered ore of a good grade, but its extent has not yet been determined.

D. J. McNally, of Nelson, B.C., has installed at the Wilcox mine the ten stamp mill, which was formerly on Lemon Creek, Slocan Lake Division.

The Fulton Iron Works, of San Francisco, have received the contract for the erection of a hot blast furnace for the Iron Mask mine, at Kamloops.

The Reco mine in the Slocan declared a March dividend of $19.164, amounting to two per cent. The total dividends paid by the Reco to date amount to $326,246.

The Le Roi No. 2 has decided to lengthen its shaft from the present depth of 900 feet to the depth of 1,450 feet, so as to connect with the workings of the Le Roi mine.

Late reports from the Tyee Copper mines are not very encouraging, the developments below the 200 foot level having failed to prove the existence of new ore bodies.

The outputs of the Hewitt and of the Emily Edith mines, in the Slocan, are being shipped to the Hall smelter. The ore is a zinciferous galena requiring concentration.

The Velvet-Portland has resumed operations to the extent of pumping out the mine. When the mine is free of water, about fifty men will be employed for the present.

The smelting works of the Granby Consolidated Mining and Smelting Company reduced 596,253 tons of ore during 1904. Of this amount 549,703 tons came from the company's mines.

Representative Galliher reports that Dr. Robert Bell intends to secure the services of Prof. R. W. Brock for the making of a structural geology map of Rossland this season.

Machinery for the enlargement of the plant at the Granby works has arrived, and it is hoped by the company that two new furnaces will be in operation in the month of July.

The Granby mines are shipping an average of 1,000 tons a day to the smelting works. When the two new furnaces are completed it is expected that the output will reach 1,500 tons.

The gold veins of Forty-nine Creek have again received the attention of inexperienced capitalists, in the shape of some United States people who have purchased three claims owned by Joseph Duhamel.

Some owners of property in Lardeau are endeavoring to secure eastern capital with which to utilize the water power of the Fish River, about one and a half miles from Camborne, for electric power purposes.

During the night of March 11th the tipples, stable and one power house of the Coal Creek colliery of the Crow's Nest Company were destroyed by fire. The loss in money is put at $200,000 and in time at four months.

The "Boston News Bureau" is authority for the statement that the Granby Company is producing its copper for eight cents a pound. We fancy that some of our western smelter men will take issue with that statement.

The Canadian Smelting Works, at Trail, have demolished the last of the furnaces built by Mr. F. A. Heinze for smelting copper-gold ores. The furnace to be erected in its stead will have a capacity of 350 tons of ore per diem.

The Yankee Girl mine, in Ymir district, claims a discovery of nickel ore of commercial importance, and reports that a trial shipment will be made to the Canadian Copper Co. at Sudbury. The ore is reported to average five per cent.

The returns on Arlington mine ore sent to the Hall smelter, at Nelson, during the month of February, amounted to 837 ounces of gold, 1,635 ounces of silver, and 19,000 pounds of lead; the average value in gold was $57; in silver, $2.80 per ton.

Development work going on at the coal mines near Enderby, in the Okanagan Valley, is very encouraging. The seam has been found to be twenty feet thick, interseamed with small layers of fire-clay running from two to three inches in thickness.

The Wellington Colliery Company, of Vancouver Island, was obliged to close in March for a short time, because of having no space in which to put the coal which had been mined. There has been a deficiency of hulls for the transportation of coal for some time.

Superintendent Stewart, of the Centre Star and War Eagle mines, is earning a well werited reputation as an economist; he has cut down the expense of mining, and lopped off unnecessary labor to such an extent that the mine profits should be largely increased.

During the month of March the St. Eugene mine, in East Kootenay, shipped the largest amount of ore in its history. 3,700 tons of concentrates were shipped, from nearly 15,000 tons of ore mined. Of the production, 3,100 tons were shipped abroad, and 600 tons were sent to the home smelters.

The gold district centering round Camborne, in the Lardeau, promises considerable development during this season. The Imperial Mining & Development Company, in driving a cross cut, have opened up fifteen feet of mineralized material, one wall of which is reported to show free gold in large amounts.

The Bonnington Falls Company, known as the West Kootenay Power & Light Company, have made large contracts with Boundary consumers for the supply of electricity. The Power Company will develop an additional 20,000 horse-power from the upper rapid at Bonnington Falls. It is proposed to have the new power carried to Boundary at a voltage of 60,000.

The Ottawa mine, in the Slocan district, has developed a new ore chute during the last few weeks. This new chute contains six inches of high grade silver-lead ore, and it was found on the west vein, which is now called the "Noble" vein. The chute was cut at a depth of about 100 feet from the surface, and assay values are reported to run as high as 850 ounces of silver to the ton.

The St. Eugene Consolidated Mining Company has a deficiency of air compressors in its plant, and has therefore ordered a 30-drill compressor from the Jenckes Machine Company, Sherbrooke, Quebec. This machine is to be shipped, installed and in running order by the first of August. This additional equipment will provide air for 50 drills, there being now in use compressor capacity for 20 rock drills.

The Coal Creek Colliery of the Crow's Nest Pass Coal Co. has erected a temporary tipple to replace the one burned on the 11th of March. It is hoped that the regular output will be resumed by means of temporary tipples before the close of the present month. The new tipple will probably be constructed of steel, and the total amount of estimated expenditure required to replace the structure burned will come to the sum of $200,000.

The Consolidated Montreal & Boston Company's affairs are still under discussion by the shareholders. Mr. Samuel Newhouse, of Colorado fame, is reported to have sent his expert to the property to make an exhaustive examination, with the intention of securing control. Since publicity was given to the affairs of this corporation by the court proceedings in New York City, the original underwriting syndicate has evinced no desire to continue in control of the property, but has shown a willingness to surrender, if necessary, the large block of stock which it holds.

The Skylark Development Company took over the Skylark mine in November, 1904, and since that date has operated the property so successfully that all expenses of mining and marketing have been met, payments amounting to $6,000 have been made, and there remains a substantial cash balance in the treasury. The ore of the Skylark is high grade; in 1893 shipments returned from 150 to 300 ounces of silver and three-quarters to one ounce in gold per ton. To-day the first-class ore yields from $125 to $140 per ton; second-class, from $35 to $40 per ton. The Granby and Nelson furnaces get the output.

A new company has been organized to operate in the Atlin district by the use of the steam shovel for mining operations, which will be known as the Northern Mines, Limited. Owing to the scarcity of water in Atlin for the operation of hydraulic works, the promoters of the company have believed that equivalent effects can be obtained by the use of the steam shovel. The operations will be commenced on Spruce Creek, upon which it is now claimed returns have been obtained, running from $2 to $10 per cubic yard. The prospectus states that the estimated cost of the first steam shovel, installed and ready for operation, will be $16,000, but it is doubtful if this sum will provide for the complete outfit. The company is unique in its modest capital, which is only $50,000. Its managing director is Mr. A. H. Bromly, an engineer who is well known in British Columbia, and it also has the services of Mr. R. D. Fetherstonhaugh as superintendent.

NORTH-WEST TERRITORIES.

McLeod Bros., of Blairmore, have secured the contract for supplying mine timbers to the Canadian American Coal Co.

The mines at Bellevue are shipping about three hundred tons of coal daily. Two tipples have been completed with tracks for forty cars. Almost the whole output is taken by the C. P. R.

The Lille collieries are installing a large tipple at No. 1 mine. It is to handle 2,000 tons of coal a day, and will therefore be one of the large tipples of Canada. The shaking screens, picking tables and automatic dumps are now being put in place.

Reports from Frank, Alberta, are to the effect that the new zinc furnaces, now under construction by the Canadian Metal Company, will be of quite a different type to the gas-fired furnaces used in Belgium. The stacks are low in height, and will be notable as the first of their kind in this country.

YUKON.

The total amount of dust from 40 Mile in 1904, amounted to 18,071 ounces, or about $270,000.

The Syndicat de Lyonnais has ordered a dredge from the Risdon Iron Works, San Francisco, to be placed on Sixty Mile River.

Some 80 to 100 men are at work on Chicken Creek, a tributary of 40 Mile River, and an equal number on Wade Creek. These two creeks put out $200,000 last year.

The great activity on Quartz Creek, which has previously been noted in these columns, is still maintained. There are from 300 to 350 men at work on the creek.

A ledge of gold-bearing quartz is reported to have been found on Woodchopper Creek, twenty miles below Charley River. Some of the quartz has been taken to the Government mill at Dawson for testing.

Claim 71 A below, on Hunker Creek, has suffered damage through the burning of its surface works. The claim was equipped with a large boiler and pump, and a 15 H.P. hoist. The fire occurred through carelessness.

The Canadian-Klondike Company, one of the largest holders of territory in the Yukon (having acquired the celebrated Boyle Concession), has ordered a large dredge, to be built in sections, on the "Knock-down" plan. This is to be put together on arrival in the northern territory. This order has been placed with the Marion Steam Shovel Company, of Marion, Ohio, and it is hoped that the dredge will be in place and ready for operation some time in August.

The new member for the Yukon, Dr. Thomson, is urging a number of propositions upon the Government, looking to the furtherance of mining interests in the Yukon. Among the matters suggested are, a reduction on free miners' licenses; a remission of royalties for ten years on copper and gold obtained from quartz mines; enlargement of discovery claims from 500 to 1,000 feet, and of ordinary placer claims from 250 to 500 feet. An hydrographic survey of the Indian and Klondike Rivers has also been asked for.

Officials of the White Pass and Yukon Railway report that they are likely to have as much business as the road can handle during the season of 1905. The very large amount of material needed for the Klondike Mines Railway will be brought in by the White Pass Road, also the large dredges and heavy tonnage hydraulic piping which have been contracted for by the Detroit-Yukon Company, and several other companies, who are expecting to complete their plants during the present season. The railway will build a number of large barges this year for the towage of freight.

ASBESTOS NOTES.

The following tables show the shipments of crude asbestos, fibre and "asbestic" and sand over the line of the Quebec Central Railway for the years 1903 and 1904 :—

	1903. Tons.	1904. Tons.	Increase. Tons.	Decrease. Tons.
Crude asbestos	2,928	3,990	1,062	...
Fibre asbestos	21,939	21,525	.....	414
Sand and asbestic	5,132	7,577	2,455	...
Totals	29,989	33,092	3,517	414

COAL NOTES.

The International (Dom. No. 6) has put in a new hoisting engine.

The Dominion Coal Co. is erecting a general store and twenty-five dwellings at Dominion No. 6.

The Dominion Coal Co. is extending its Halifax wharf to permit of the erection of coal pockets thereon.

The winter shipments from Louisburg Pier have been steadily maintained. During the first week in March four steamers (for Halifax, St. John and Boston) were loaded and despatched.

The year 1905 promises to be the best that the Crow's Nest Pass district has ever seen. The demand for both steaming and coking coals is steadily increasing and is inducing the present companies to provide for largely increased outputs.

The proposed reorganization of the finances of the Dominion Coal Co. is meeting with approbation on all sides. In addition to reducing the yearly amount of fixed charges, the plan proposed will provide sufficient surplus to clear off the company's floating debt.

The Gowrie and Blockhouse Co. have repaired its pier, pushed work ahead of the narrow places in the seam and is now in good shape to supply coal at the opening of navigation. The six foot seam has been cut by the borehole at a depth of about two hundred feet; a new hole will be started nearer the crop of the seam.

The output and shipments made by the Dominion Coal Company, Ltd., for the month of March, 1905, were :—

Colliery.	Tons.
Dominion No. 1	33,277
" No. 2	42,450
" No. 3	21,748
" No. 4	45,081
" No. 5	46,552
" No. 7	8,565
" No. 8	7,692
" No. 9	23,400
	228,765
Total shipments for the month of March	173,595

The Dominion Coal Co. have decided to install a number of shearing machines with the object of securing larger coal. The shearers are of English make, and are known as "Little Hardys"; they cut a slot about three inches in width from roof to floor after the under cut has been made, thus requiring a smaller amount of powder for the blast and ensuring a less amount of "smalls."

The enormous growth of the business in coal is illustrated by some figures obtainable from the records kept in the United States. From 1885 to 1895 there was an increase in production of 81,000,000 tons, from 1895 to 1905 the increase was 177,000,000 tons. Should this increase be maintained during the coming decade, the year 1915 will see the enormous output of 542,000,000 tons of coal. These figures take one's breath away.

THE WORLD'S PRODUCTION OF COAL.

	Total World's production. Million tons.	By United States. million tons.	Per cent.
1870	213.1	32.9	15.4
1875	275.4	46.7	17.0
1880	330.3	68.0	20.6
1885	399.8	99.2	24.8
1890	503.3	140.9	28.0
1895	575.1	172.4	30.0
1900	755.4	240.8	31.9
1901	777.4	261.9	33.7
1902	788.9	269.3	33.9
1903	864.1	319.1	36.9

—Coal Trade Journal.

Annual Report of the British Columbia Copper Company.

At the general meeting of the company, held in New York, in February, the report of the directors and the balance sheet as at the close of business, November 30, 1904, were submitted. The audited statement of accounts was for two years. The directors' report was as hereunder:

Since your last annual meeting your company has operated its two furnaces with fair regularity with ore from your own mines and with some custom ores from neighboring mines valuable to our own as fluxes.

The development of your mines has been favorable, and you have quite as much more in sight and proven as at the time of the last report submitted to you.

Up to this time the net earnings have been variable, but, barring accidents, we anticipate more regular and improving results.

Our converter plant has been in operation for some time, and has proven to be of material benefit in enabling us to ship blister copper 99 per cent. fine instead of matte carying 45 per cent. copper.

The large accumulation of flue dust made a briqueting plant absolutely essential, and is now being installed, and will be in operation shortly. The extraordinary cold weather prevailing has delayed its completion.

We have equipped our whole plant for operation by electricity as motive power, and we have also installed an electric locomotive and system for the economical handling of our slags.

We have had some serious obstacles to continuous operation of our plant, besides some unavoidable accidents during the past two years, yet we believe that our costs of mining, smelting and converting will compare with any similar plant.

The company has disposed of 73,259 shares of treasury stock during the two years aforesaid, and has expended upon additions to the plant and in acquiring new mining interests in the same period, $320,780.

The company has also recently obtained interests in options on important properties in our region believed to carry good copper values, the ores of which can be cheaply mined and reduced.

We purpose doubling immediately our blast furnace capacity.

The statement of assets and liabilities is as under:

Assets.

Mining property, mines, smelter building, machinery, real estate, etc.	$1,580,780.90
Greenwood City debenture bonds	3,600.00
Accounts receivable	53,282.25
Finished products, supplies, ores, etc., on hand	122,947.59
Cash on hand and in banks	18,817.82
Total	$1,779,428.56

Liabilities.

Capital stock, authorized issue, $2,000,000.00, issued	$1,576,750.00
Accounts payable	110,106.76
Bills payable	3,650.00
Surplus earnings for two years	88,921.80
Total	$1,779,428.56

Digest of Recent Patents; Mining and Metallurgical.

CANADIAN.

March 7, 1905.

784,502.—Magnetic Ore-Separator. Lewis G. Rowand, Camden, N.J., assignor to Wetherill Separating Company, a corporation of New Jersey. The combination of a conveyor-belt adapted to convey the material to be treated, of magnets above and below said belt, the pole-pieces of opposite magnets being in proximity to the conveyor-belt, the upper magnet having the stronger magnetic field.

784,105.—Dumping-Car. Walter R. Cliffe, Harrisburg, Pa. The combination of a car, a tilting car-box, having a discharge-opening, a movable door closing and opening, arms pivoted to the car-box and connected with said door, a bell-crank lever connected to the car-box and co-acting with the door, whereby the movement of the car-box opens the door, a hand-lever suitably supported, and pivoted connections between said hand-lever and the car-box, whereby the movement of the hand-lever tilts the car-box to dump the same and simultaneously open the door.

784,146.—Machine for Concentrating Mineral Ores. Gaylen R. Duncan, Three Rivers, Canada, assignor of three-fourths to Drummond, McCall & Co., a firm. The combination of a pulp-feed, a wash-water supply and a dropping-pan adapted to supply a shower of drops of water upon the stream of wash-water and the material which has settled on the surface of the machine beneath the stream of wash-water.

784,083.—Briquet-Press. John Treadwell, San Francisco, Cal. A briquet-press, an open-bottomed feed-hopper, a wheel having a peripheral feed-groove and rotating beneath said hopper, transverse moulds formed in the rim and opening from said groove, oppositely-acting plungers movable in the rim of the wheel, and means for obstructing the feed-groove and so regulating the delivery of material from the feed-groove to the moulds formed in the rim.

March 14, 1905.

785,067.—Ore-Roasting Furnace. Horace M. Heath, Newton, Mass., and George Morrice, Sonora, and Robert L. J. Gruss, Genesee, Cal., assigned by direct and mesne assignments, to Frank W. McAleer, Newton, Mass. In an ore-roasting furnace an oxidizing-flue having non-perforated sides and open to the atmosphere only at the upper end where it receives the ore to be treated, means to heat said flue externally, a plurality of air-tight chambers beneath said flue, means to connect the lower end of said flue with either end of said chambers, and means to deliver oxygen to the lower end of the flue above said chambers.

784,956.—Furnace for Treating Metal. Jacques Morat, New York, N.Y. A vessel for treatment of molten metal, having a restricted upper opening, and mounted with its longitudinal axis at an angle to a vertical line, and rotatable as an entirety at will about said axis, and having in its side an aperture for the passage of metal.

784,598.—Cyanid Agitator. Eugene Stevens, Leadville, Colo. The combination of a containing vessel provided with a substantially frusto-conical portion, a basin engaging said frusto-conical portion, said basin being provided with a bearing, a tubular member disposed within said containing vessel, and a revoluble shaft provided with a carrier-thread disposed within said tubular member, said revoluble shaft being provided with a journal engaging said bearing within said basin.

785,002.—Manufacture of Iron and Steel. James J. Hudson, Philadelphia, Pa. The improvement in the art of manufacturing iron and steel, which consists in placing a combined charge of charcoal and the material to form such metal upon the hearth or bottom of a furnace, melting said metals with the charcoal, and maintaining a molten bath of the metal in contact with the charcoal until the completion of the heat.

March 21, 1905.

785,525.—Dust-Collector. George Simpson, Richmond, near Melbourne, and William J. Burton, Richmond, Victoria, Australia. A dust-collector involving a casing having a V-shaped partition provided with openings closed by flap-valves and forming a pump-chamber, a horizontally extending partition arranged in said casing and forming in connection with one side of said V-shaped partition a dust-expansion chamber, an inlet for said expansion chamber, said horizontally extending partition in connection with the other side of said V-shaped partition forming a dust-settling chamber within said casing, an outlet for said settling-chamber, a cylinder communicating with said outlet and containing a body of water in the lower portion thereof, diaphragms arranged in said cylinder at the upper portion thereof, a spraying device arranged in the upper portion of said cylinder, and means communicating with said spraying device and the liquid at the lower portion of said cylinder for forcing said liquid through said spraying device.

785,565.—Amalgamator. Patrick McEntee, Spokane, Wash. An amalgamator, comprising a sluice having amalgamating-plates, means for feeding material to be treated, together with water and mercury, to the sluice, a collector into which the sluice discharges, said collector having means for separating the water and tailings from the amalgam, and the free mercury from the latter, and means to return the recovered mercury to the sluice for reuse therein.

785,214.—Apparatus for Extracting Metals from their Ores. Wilbur A. Hendryx, Los Angeles, Cal. In an apparatus a tank having a conical bottom and constructed to hold a supply of ore-pulp, a vertical independent passage-way for said ore-pulp through the body of said tank to the atmosphere, channeled spaces in said passage-way, an aerating-plate surounding the top of said passage-way, a rotating shaft connected to said tank, and means connected with said shaft for moving said supply of ore-pulp up said passage-way and channeled spaces and over said aerating-plate and down through said tank in a continuous, endless stream.

785,535.—Electric Furnace. William C. Arsem, Schnectady, N.Y., assignor to General Electric Company, a corporation of New York. An electric furnace having an air-tight chamber, a refractory heater therein, means for supporting material to be heated in close proximity to said refractory heater, and means for exhausting the air from said chamber.

March 28, 1905.

786,121.—Smelting-Furnace. Patrick Healey, Campbird, Colo., assignor of one-half to James D. Ireland and Avery Buckingham, Campbird, Colo. The combination of a double-walled blast-furnace, of an air-pipe for introducing air between the walls, and a spraying device in the air-pipe located at a point outside of the point where the air-pipe enters the outer wall of the furnace for charging the air with an atomized spray of water and cooling the inner wall thereby.

786,048.—Process of Purifying Pig Metals. John B. Nau, New York, N. Y. A process which consists of pouring liquid metal upon a mass of broken pieces of solid oxidizing material in such manner that the liquid metal will be broken up and descend in small streams through the spaces between and in contact with the pieces of oxidizing material, causing a bath of the liquid metal to accumulate, maintaining immersion of the oxidizing material in the bath, so that the bath fills the spaces in the immersed mass of oxidizing material, for the period desired, and then separating the liquid purified metal from the oxidizing material.

786,200.—Gas-Producer. Alfred B. Duff, Pittsburg, Pa. In combination, a gas-producer, a water-sealed ash-trough therefor, an air-receiving casing in the ash-trough, substantially vertical gratings carried on the casing and distributed over a large area, a free space for the fall of ashes between the air-casing and producer walls, a louvered cone superimposed on the gratings, said cone consisting of a louvered cone superimposed on the casing, and a cover superimposed thereon so as to leave air-space in the wall of the cone, said air-spaces in the cone and grating being so proportioned that a sufficient quantity of air is made to act on the upper part of the fuel and light that part up to incandescence, while the lower grating causes the air to act upon such ignited fuel as it descends with a finer distribution and without raising the temperature at any point too high.

786,051.—Process of Reducing Ores. Dennis R. Robertson, Leadville, Colo. A process which consists in subjecting the finely-divided material in the presence of water to the action of sodium salt and a potassium salt, heating and agitating the mixture, adding salts of iron and an acid and again agitating, allowing the mixture to rest, and removing the separated values.

786,185.—Process of Producing Metals and Alloys. Henry S. Blackmore, Mount Vernon, N.Y. A process which consists in fusing an oxy compound of a metal or metals having greater affinity for oxygen than the metal desired, adding thereto an oxy compound of the metal desired with another metal an alloy with which is sought, and subjecting the mass to the action of an electrolytic current capable of liberating the metals desired and replenishing the mass with more metal oxy compound from time to time as the bath is depleted therefor by reduction.

PROVINCE OF QUEBEC

The attention of Miners and Capitalists in the United States and in Europe is invited to the

GREAT MINERAL TERRITORY

Open for investment in the Province of Quebec.

Gold, Silver, Copper, Iron, Asbestos, Mica, Plumbago, Phosphate, Chromic Iron, Galena, Etc.

ORNAMENTAL AND STRUCTURAL MATERIALS IN ABUNDANT VARIETY.

The Mining Law gives absolute security to Title, and has been specially framed for the encouragement of Mining.

Mining concessions are divided into three classes :—

1. In unsurveyed territory (*a*) the first class contains 400 acres, (*b*) the second, 200 acres, and (*c*) the third, 100 acres.

2. In surveyed townships the three classes respectively comprise one, two and four lots.

All lands supposed to contain mines or ores belonging to the Crown may be acquired from the Commissioner of Colonization and Mines (*a*) as a mining concession by purchase, or (*b*) be occupied and worked under a mining license.

No sale of mining concessions containing more than 400 acres in superficies can be made by the Commissioner to the same person. The Governor-in-Council may, however, grant a larger extent of territory up to 1,000 acres under special circumstances.

The rates charged and to be paid in full at the time of the purchase are $5 and $10 per acre for mining lands containing the superior metals* ; the first named price being for lands situated more than 12 miles and the last named for lands situated less than 12 miles from the railway.

If containing the inferior metal, $2 and $4 according to distance from railway.

Unless stipulated to the contrary in the letters patent in concessions for the mining of superior metals, the purchaser has the right to mine for all metals found therein ; in concessions for the mining of the inferior metals, those only may be mined for.

Mining lands are sold on the express condition that the purchaser shall commence *bona fide* to mine within two years from the date of purchase, and shall not spend less than $500 if mining for the superior metals ; and not less than $200 if for inferior metals. In default, cancellation of sale of mining lands

(*b*) Licenses may be obtained from the Commissioner on the following terms :—Application for an exploration and prospecting license, if the mine is on private land, $2 for every 100 acres or fraction of 100 ; if the mine is on Crown lands (1) in surveyed territory, $5 for every 100 acres, and (2) in unsurveyed territory, $5 for each square mile, the license to be valid for three months and renewable. The holder of such license may afterwards purchase the mine, paying the prices mentioned.

Licenses for mining are of two kinds: Private lands licenses where the mining rights belong to the Crown, and public lands licenses. These licenses are granted on payment of a fee of $5 and an annual rental of $1 per acre. Each license is granted for 200 acres or less, but not for more ; is valid for one year, and is renewable on the same terms as those on which it was originally granted. The Governor-in-Council may at any time require the payment of the royalty in lieu of fees for a mining license and the annual rental—such royalties, unless otherwise determined by letters patent or other title from the Crown, being fixed at a rate not to exceed three per cent. of the value at the mine of the mineral extracted after deducting the cost of mining it.

*The superior metals include the ores of gold, silver, lead, copper, nickel, graphite, asbestos, mica, and phosphate of lime. The words inferior metals include all other minerals, and ores.

The fullest information will be cheerfully given on application to

THE MINISTER OF LANDS, MINES AND FISHERIES,

PARLIAMENT BUILDINGS, QUEBEC.

Ontario's Mining Lands..

THE Crown domain of the Province of Ontario contains an area of over 100,000,000 acres, a large part of which is comprised in geological formations known to carry valuable minerals and extending northward from the great lakes and westward from the Ottawa river to the Manitoba boundary.

Iron in large bodies of magnetite and hematite: copper in sulphide and native form; gold, mostly in free milling quartz; silver, native and sulphides; zincblende, galena, pyrites, mica, graphite, talc, marl, brick clay, building stones of all kinds and other useful minerals have been found in many places, and are being worked at the present time.

In the famous Sudbury region Ontario possesses one of the two sources of the world's supply of nickel, and the known deposits of this metal are very large. Recent discoveries of corundum in Eastern Ontario are believed to be the most extensive in existence.

The output of iron, copper and nickel in 1903 was much beyond that of any previous year, and large developments in these industries are now going on.

In the older parts of the Province salt, petroleum and natural gas are important products.

The mining laws of Ontario are liberal, and the prices of mineral lands low. Title by freehold or lease, on working conditions for seven years. There are no royalties.

The climate is unsurpassed, wood and water are plentiful, and in the summer season the prospector can go almost anywhere in a canoe.

The Canadian Pacific Railway runs through the entire mineral belt.

For reports of the Bureau of Mines, maps, mining laws, etc., apply to

HONORABLE E. J. DAVIS,
Commissioner of Crown Lands,

or

THOS. W. GIBSON,
Director Bureau of Mines,
Toronto, Ontario.

Dominion of Canada

SYNOPSIS OF REGULATIONS

For disposal of Minerals on Dominion Lands in Manitoba, the North-west Territories and the Yukon Territory.

COAL.

Coal lands may be purchased at $10 per acre for soft coal and $20 for anthracite. Not more than 320 acres can be acquired by one individual or company. Royalty at the rate of ten cents per ton of 2,000 pounds shall be collected on the gross output.

QUARTZ.

Persons of eighteen years and over and joint stock companies holding free miner's certificates may obtain entry for a mining location.

A free miner's certificate is granted for one or more years, not exceeding five, upon payment in advance of $7.50 per annum for an individual, and from $50 to $100 per annum for a company, according to capital.

A free miner, having discovered mineral in place, may locate a claim 1500 x 1500 feet by marking out the same with two legal posts, bearing location notices, one at each end on the line of the lode or vein.

The claim shall be recorded within 15 days if located within ten miles of a mining recorder's office, one additional day allowed for every additional ten miles or fraction. The fee for recording a claim is $5.

At least $100 must be expended on the claim each year or paid to the mining recorder in lieu thereof. When $500 has been expended or paid, the locator may, upon having a survey made, and upon complying with other requirements, purchase the land at $1.00 an acre.

Permission may be granted by the Minister of the Interior to locate claims containing iron and mica, also copper, in the Yukon Territory of an area not extending 160 acres.

The patent for a mining location shall provide for the payment of a Royalty ot 2½ per cent. of the sales of the products of the location.

PLACER MINING.

Manitoba and the N. W. T., excepting the Yukon Territory.—Placer mining claims generally are 100 feet square; entry fee $5, renewable yearly. On the North Saskatchewan River claims are either bar or bench, the former being 100 feet long and extending between high and low water mark. The latter includes bar diggings, but extends back to the base of the hill or bank, but not exceeding 1,000 feet. Where steam power is used, claims 200 feet wide may be obtained.

Dredging in the rivers of Manitoba and the N. W. T., excepting the Yukon Territory.—A free miner may obtain only two leases of five miles each for a term of twenty years, renewable in the discretion of the Minister of the Interior.

The lessee's right is confined to the submerged bed or bars of the river below low water mark, and subject to the rights of all persons who have, or who may receive entries for bar diggings or bench claims, except on the Saskatchewan River, where the lessee may dredge to high water mark on each alternate leasehold.

The lessee shall have a dredge in operation within one season from the date of the lease for each five miles, but where a person or company has obtained more than one lease one dredge for each fifteen miles or fraction is sufficient. Rental, $10 per annum for each mile of river leased. Royalty at the rate of two and a half per cent. collected on the output after it exceeds $10,000.

DREDGING IN THE YUKON TERRITORY.

Six leases of five miles each may be granted to a free miner for a term of twenty years, also renewable.

The lessee's right is confined to the submerged bed or bars in the river below low water mark, that boundary to be fixed by its position on the 1st day of August in the year of the date of the lease.

The lessee shall have one dredge in operation within two years from the date of the lease, and one dredge for each five miles within six years from such date. Rental, $100 per mile for first year and $10 per mile for each subsequent year. Royalty, same as placer mining.

PLACER MINING IN THE YUKON TERRITORY.

Creek, gulch, river and hill claims shall not exceed 250 feet in length, measured on the base line or general direction of the creek or gulch, the width being from 1,000 to 2,000 feet. All other placer claims shall be 250 feet square.

Claims are marked by two legal posts, one at each end, bearing notices. Entry must be made within ten days, if the claim is within ten miles of mining recorder's office. One extra day allowed for each additional ten miles or fraction.

The person or company staking a claim must hold a free miner's certificate.

The discoverer of a new mine is entitled to a claim of 1,000 feet in length, and if the party consists of two, 1,500 feet altogether, on the output of which no royalty shall be charged, the rest of the party ordinary claims only.

Entry fee, $10. Royalty at the rate of two and one-half per cent. on the value of the gold shipped from the Yukon Territory to be paid to the Comptroller.

No free miner shall receive a grant of more than one mining claim on each separate river, creek or gulch, but the same miner may hold any number of claims by purchase, and free miners may work their claims in partnership by filing notice and paying fee of $2. A claim may be abandoned, and another obtained on the same creek, gulch or river, by giving notice and paying a fee.

Work must be done on a claim each year to the value of at least $200.

A certificate that work has been done must be obtained each year; if not, the claim shall be deemed to be abandoned, and open to occupation and entry by a free miner.

The boundaries of a claim may be defined absolutely by having a survey made and publishing notices in the Yukon Official Gazette.

PETROLEUM.

All unappropriated Dominion Lands in Manitoba, the North-West Territories and within the Yukon Territory are open to prospecting for petroleum, and the Minister may reserve for an individual or company having machinery on the land to be prospected, an area of 640 acres. Should the prospector discover oil in paying quantities, and satisfactorily establish such discovery, an area not exceeding 640 acres, including the oil well and such other land as may be determined, will be sold to the discoverer at the rate of $1.00 an acre subject to royalty at such rate as may be specified by order-in-council.

Department of the Interior,

Ottawa, February, 1904.

W. W. CORY,
Deputy of the Minister of the Interior.

PROVINCE OF NOVA SCOTIA.

Leases for Mines of Gold, Silver, Coal, Iron, Copper, Lead, Tin

—AND—

PRECIOUS STONES.

TITLES GIVEN DIRECT FROM THE CROWN, ROYALTIES AND RENTALS MODERATE.

GOLD AND SILVER.

Under the provisions of Chap. 1, Acts of 1892, of Mines and Minerals, Licenses are issued for prospecting Gold and Silver for a term of twelve months. Mines of Gold and Silver are laid off in areas of 150 by 250 feet, any number of which up to one hundred can be included in one License, provided that the length of the block does not exceed twice its width. The cost is 50 cents per area. Leases of any number of areas are granted for a term of 40 years at $2.00 per area. These leases are forfeitable if not worked, but advantage can be taken of a recent Act by which on payment of 50 cents annually for each area contained in the lease it becomes non-forfeitable if the labor be not performed.

Licenses are issued to owners of quartz crushing mills, who are required to pay Royalty on all the Gold they extract at the rate of two per cent. on smelted Gold valued at $19 an ounce, and on smelted Gold valued at $18 an ounce.

Applications for Licenses or Leases are receivable at the office of the Commissioner of Public Works and Mines each week day from 10 a.m. to 4 p.m., except Saturday, when the hours are from 10 to 1. Licenses are issued in the order of application according to priority. If a person discovers Gold in any part of the Province, he may stake out the boundaries of the areas he desires to obtain, and this gives him one week and twenty-four hours for every 15 miles from Halifax in which to make application at the Department for his ground.

MINES OTHER THAN GOLD AND SILVER.

Licences to search for eighteen months are issued, at a cost of thirty dollars, for minerals other than Gold and Silver, out of which areas can be selected for mining under lease. These leases are for four renewable terms of twenty years each. The cost for the first year is fifty dollars, and an annual rental of thirty dollars secures each lease from liability to forfeiture for non-working.

All rentals are refunded if afterwards the areas are worked and pay royalties. All titles, transfers, etc., of minerals are registered by the Mines Department for a nominal fee, and provision is made for lessees and licensees whereby they can acquire promptly, either by arrangement with the owner or by arbitration, all land required for their mining works.

The Government as a security for the payment of royalties, makes the royalties first lien on the plant and fixtures of the mine.

The unusually generous conditions under which the Government of Nova Scotia grants its minerals have introduced many outside capitalists, who have always stated that the Mining laws of the Province were the best they had had experience of.

The royalties on the remaining minerals are: Copper, four cents on every unit; Lead, two cents upon every unit; Iron, five cents on every ton; Tin and Precious Stones, five per cent.; Coal, 10 cents on every ton sold.

The Gold district of the Province extends along its entire Atlantic coast, and varies in width from 10 to 40 miles, and embraces an area of over three thousand miles, and is traversed by good roads and accessible at all points by water. Coal is known in the Counties of Cumberland, Colchester, Pictou and Antigonish, and at numerous points in the Island of Cape Breton. The ores of Iron, Copper, etc., are met at numerous points, and are being rapidly secured by miners and investors.

Copies of the Mining Law and any information can be had on application to

THE HON. A. DRYSDALE,

Commissioner Public Works and Mines,

HALIFAX, NOVA SCOTIA.

DIAMOND

DEEP DRILLING

makes economical mining and the deepest hole can be drilled at the smallest cost by a

DIAMOND ROCK DRILL

It can cut through 2,500 feet of solid rock in a vertical line. It brings up solid cylinders of rock, showing formation and character.

Made in all capacities, for Hand or Horse-power, Steam or Compressed Air—mounted or unmounted.

You will find lots of information in our new catalogue—may we send it?

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HADFIELD'S STEEL FOUNDRY CO LIMITED SHEFFIELD

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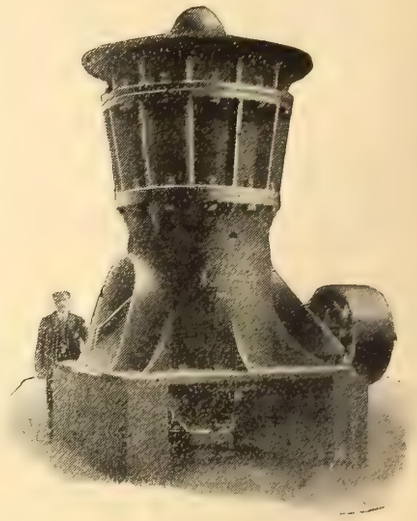
HADFIELD AND JACK'S PATENT

The Only Perfect Gyratory Stone-Crusher

THE PARTS THAT ARE SUBJECT TO EXCESSIVE WEAR ARE MADE OF

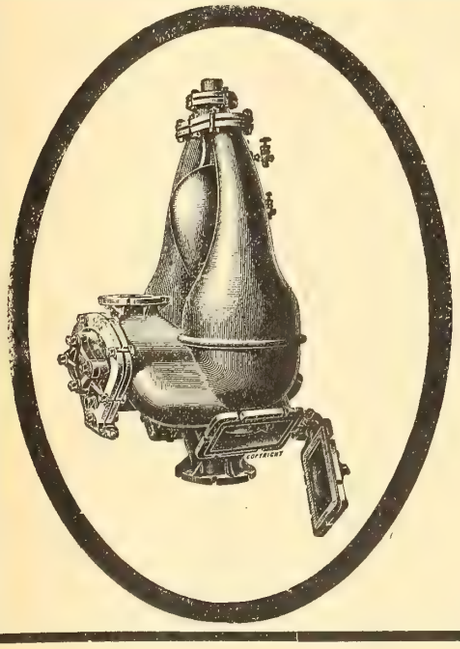
Hadfield's Patent "Era" Manganese Steel



WE MANUFACTURE **JAW** BREAKERS, CRUSHING ROLLS, ELEVATORS, BIN GATES, AND GOLD MINING REQUISITES.

Sole Representatives of the Hadfield Steel Foundry Co., Ltd., Sheffield, for Canada

PEACOCK BROTHERS, Canada Life Building, Montreal.



A Thing to Remember!

The water can often be got out
and the job finished by means of

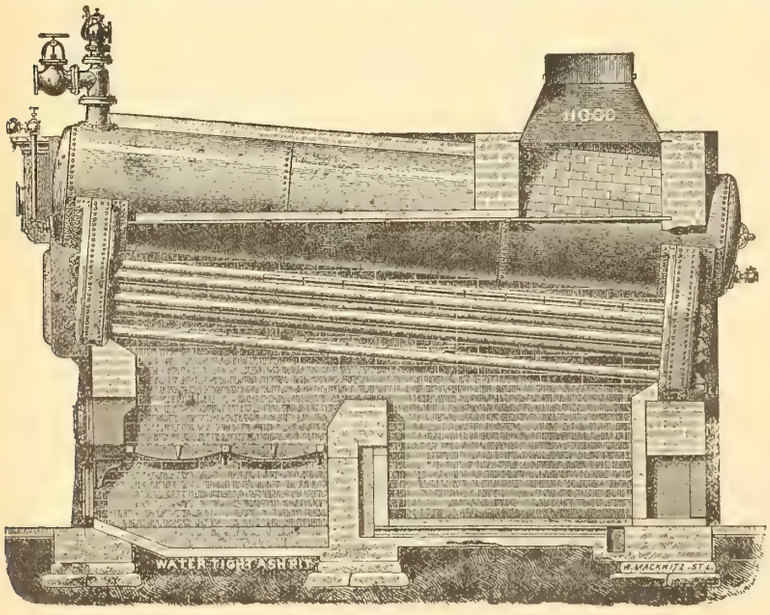
Trade **The Pulsometer** Mark

Steam Pump

whilst you would be collecting the necessary tackle for ordinary pumps.

The Pulsometer Engineering Co. Ld., Reading, England.

CANADIAN REPRESENTATIVES PEACOCK BROTHERS CANADA LIFE BUILDING Montreal



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MANUFACTURED BY

The Canadian Heine Safety Boiler Co

TORONTO, ONT.

THE HEINE SAFETY BOILER—Made in units of 100 to 500 h.p., and can be set in batteries of any number. Suitable for Mines, Pulp Mills, Water and Electric Installations, and large plants generally. The best and most economical boiler made.

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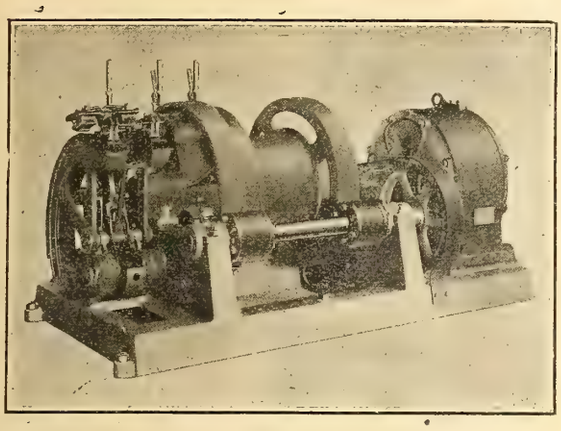
If your Blowers, Compressors, Pumps, Hoists, etc., are not electrically driven, you are not getting the best results.



Westinghouse Type C Induction Motor, Driving Mine Hoist.

Electric Drive

INCREASES PRODUCTION
DECREASES COSTS.

Some of our engineers have devoted much study to the motor requirements of mines, and we are glad to give prospective customers and their engineers the benefit of our large experience in this line.

Canadian Westinghouse Co. Limited.

General Offices and Works: HAMILTON, ONT.

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Winnipeg

Liverpool & London & Globe Bldg.
Montreal

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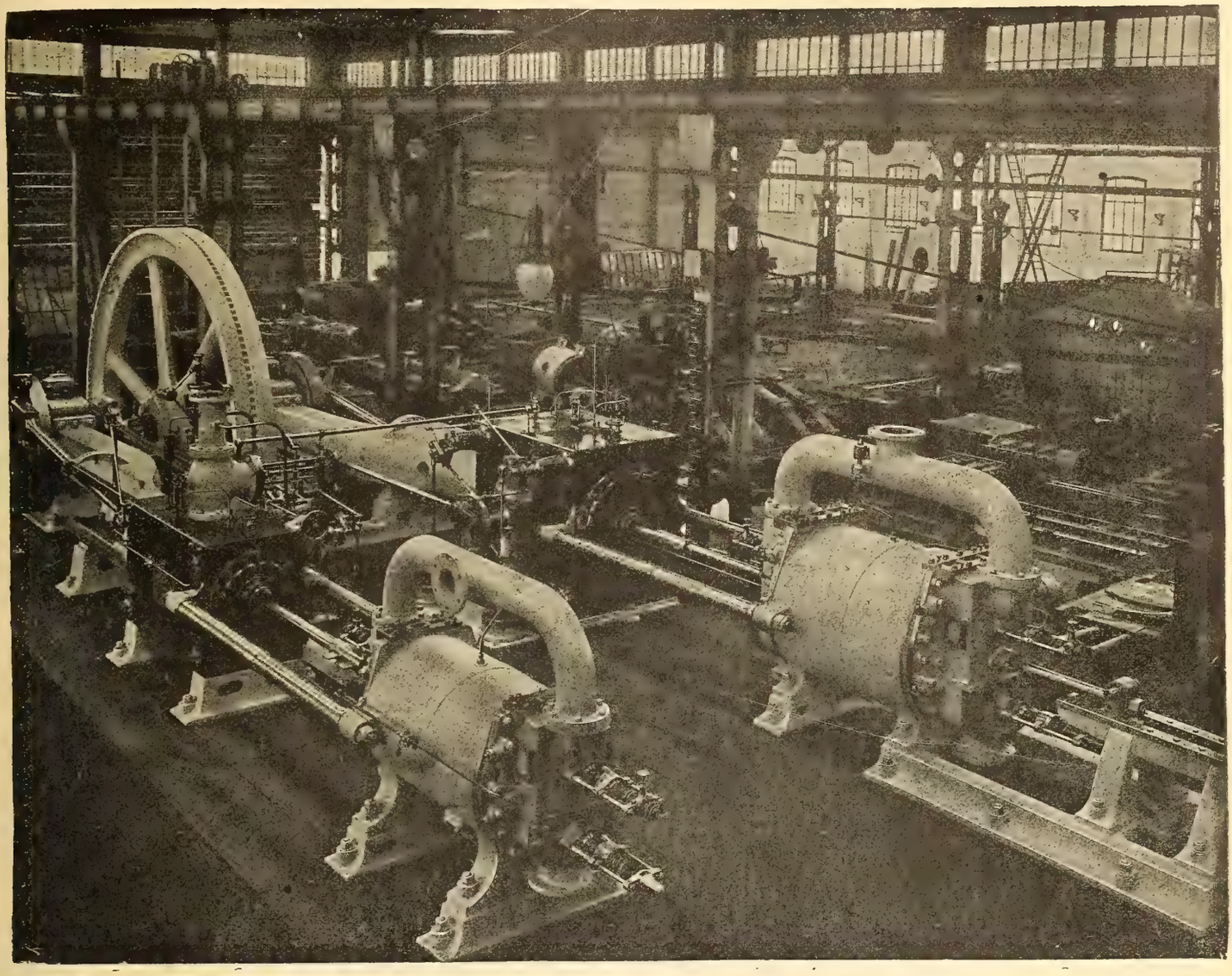

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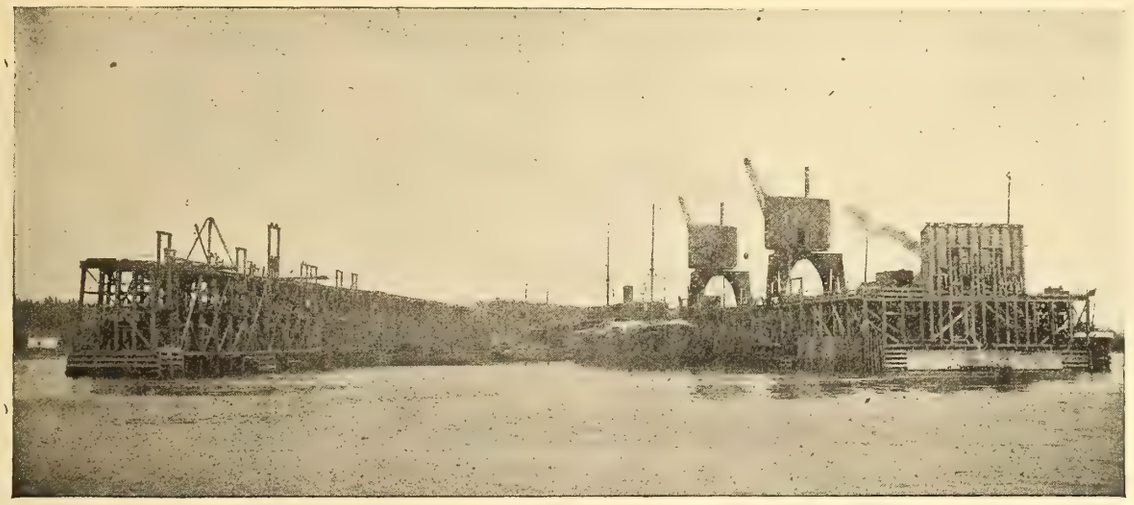

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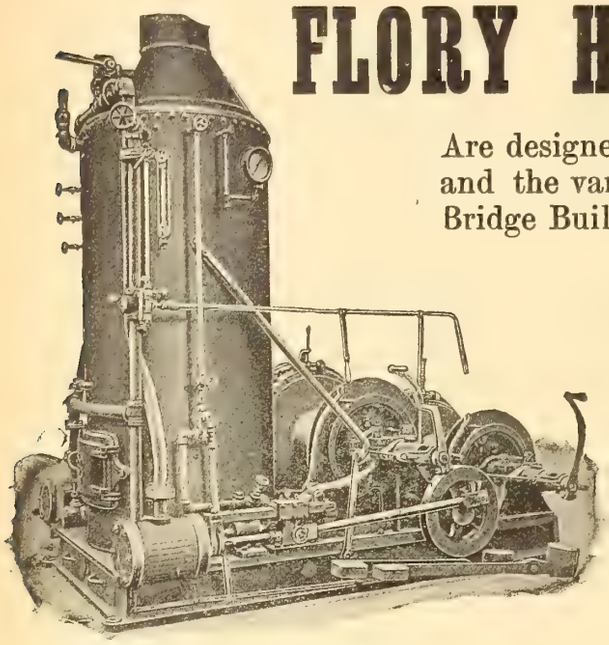

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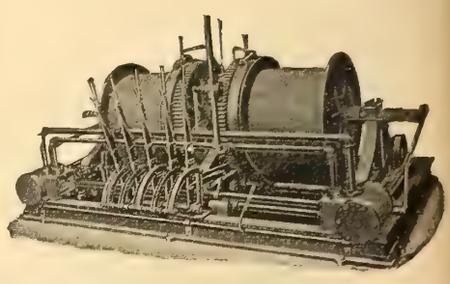

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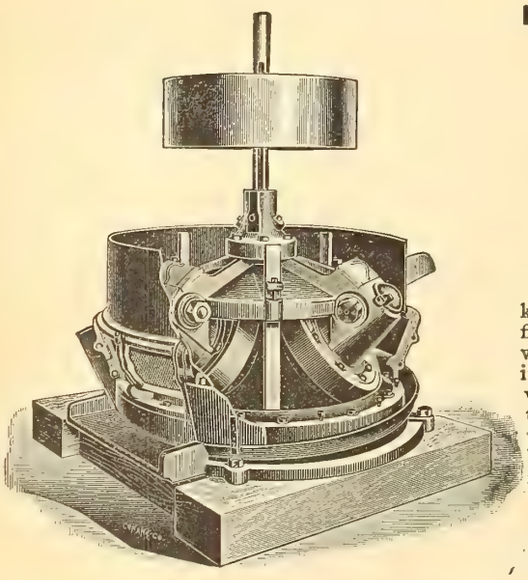

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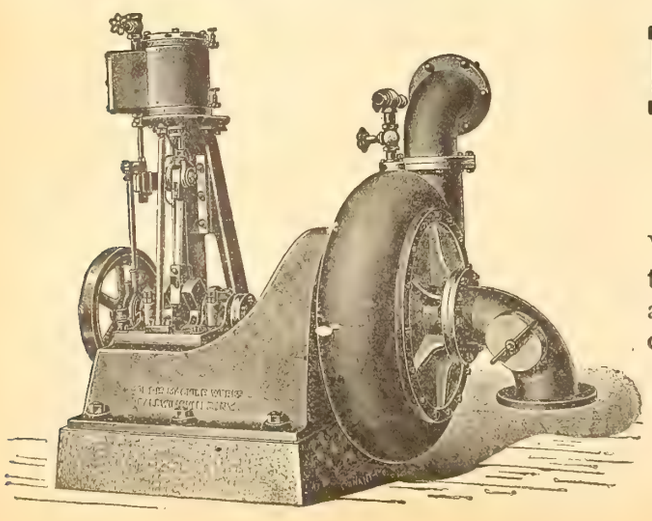

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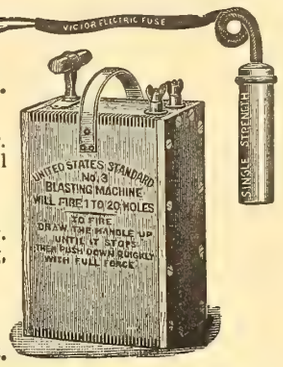

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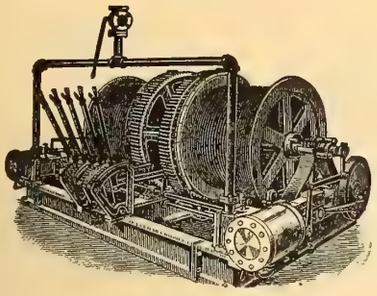

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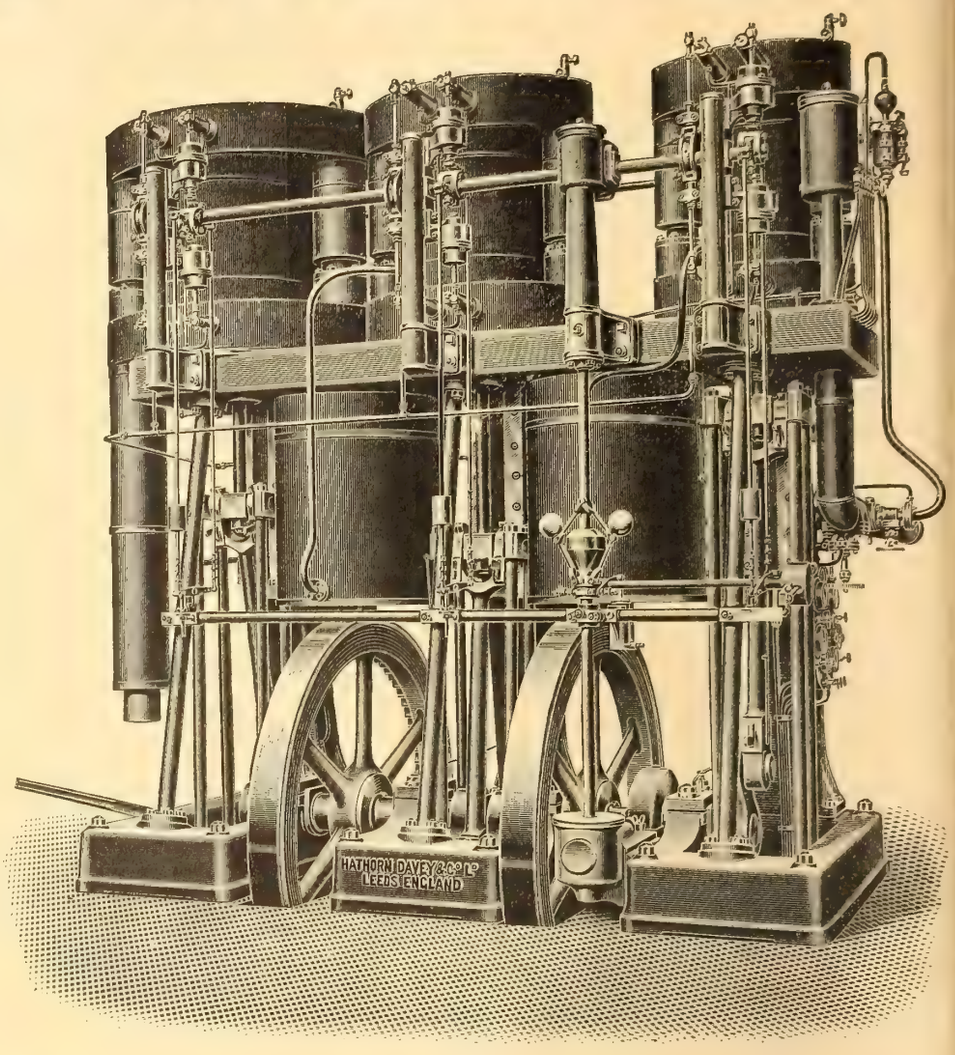

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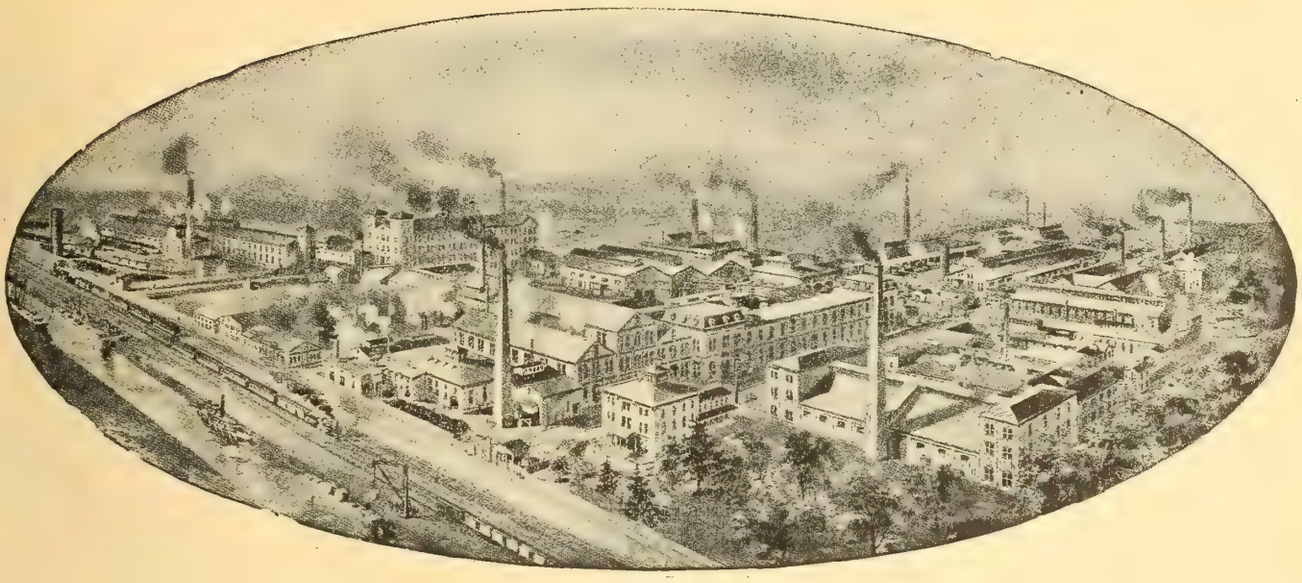

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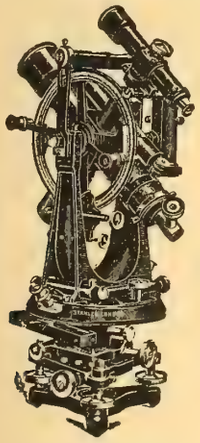

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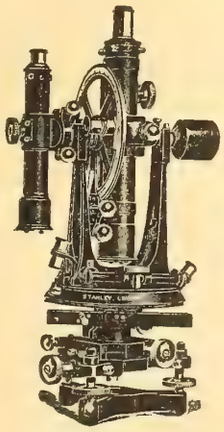

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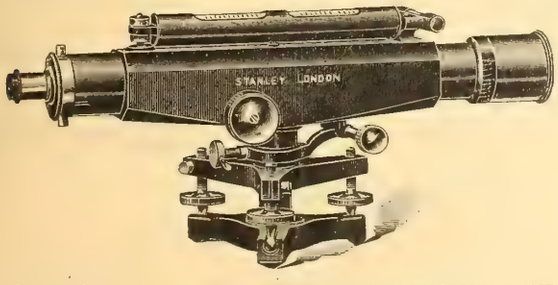

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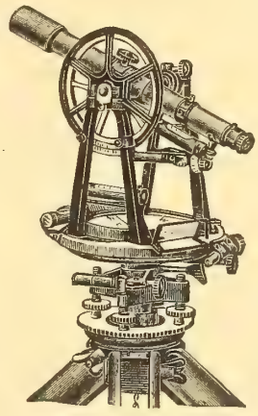

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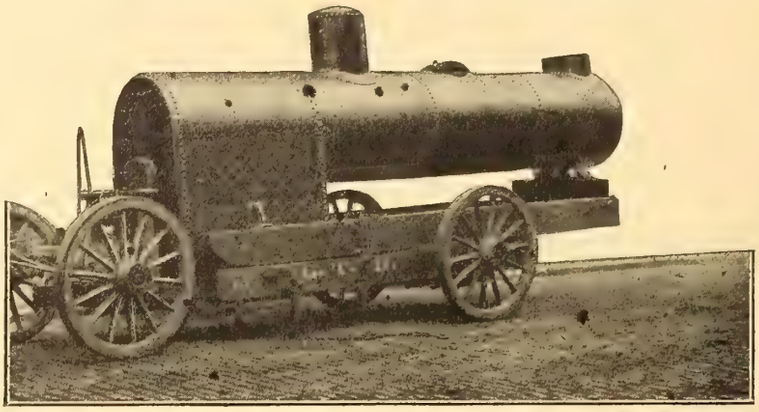

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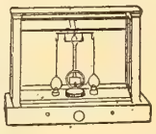

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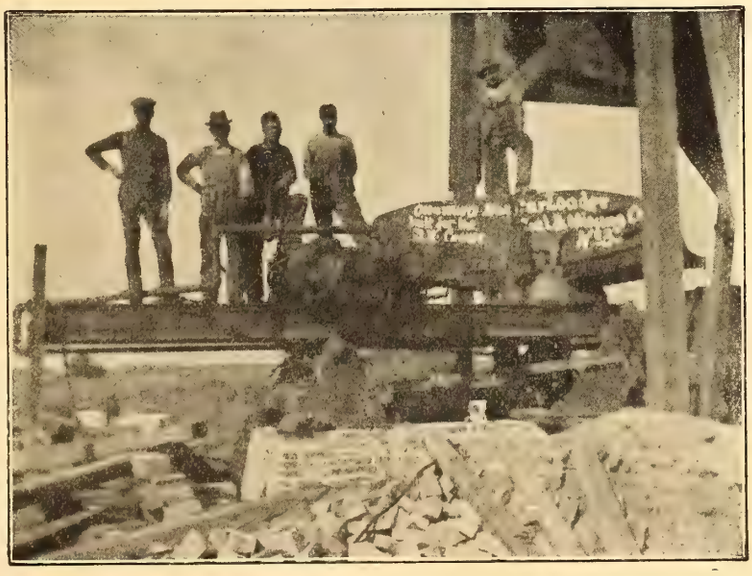

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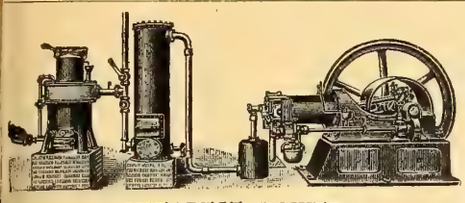

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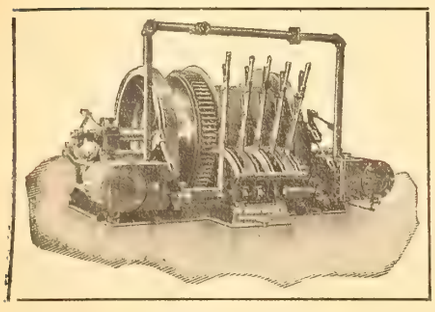

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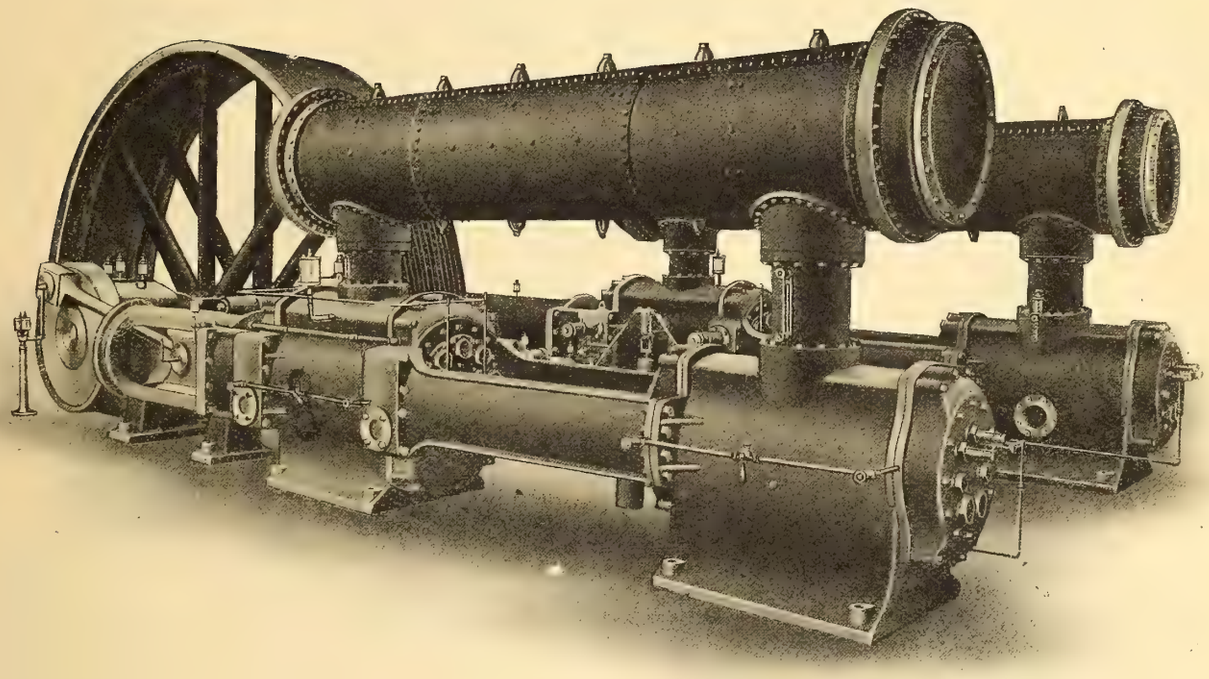

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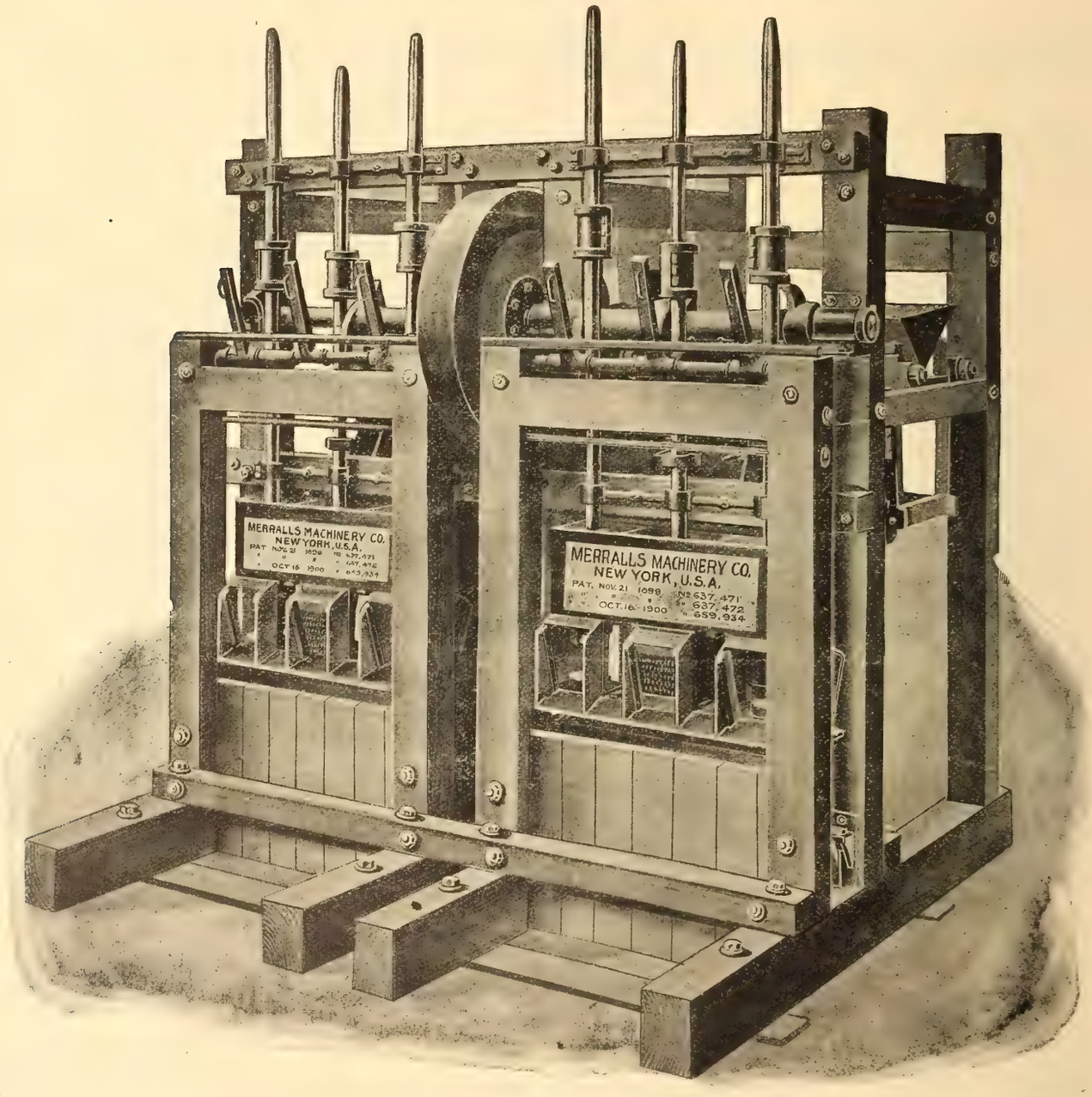

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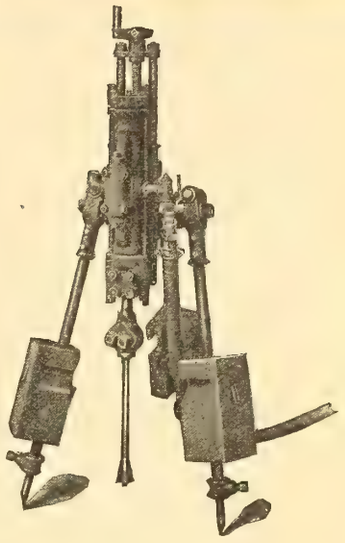

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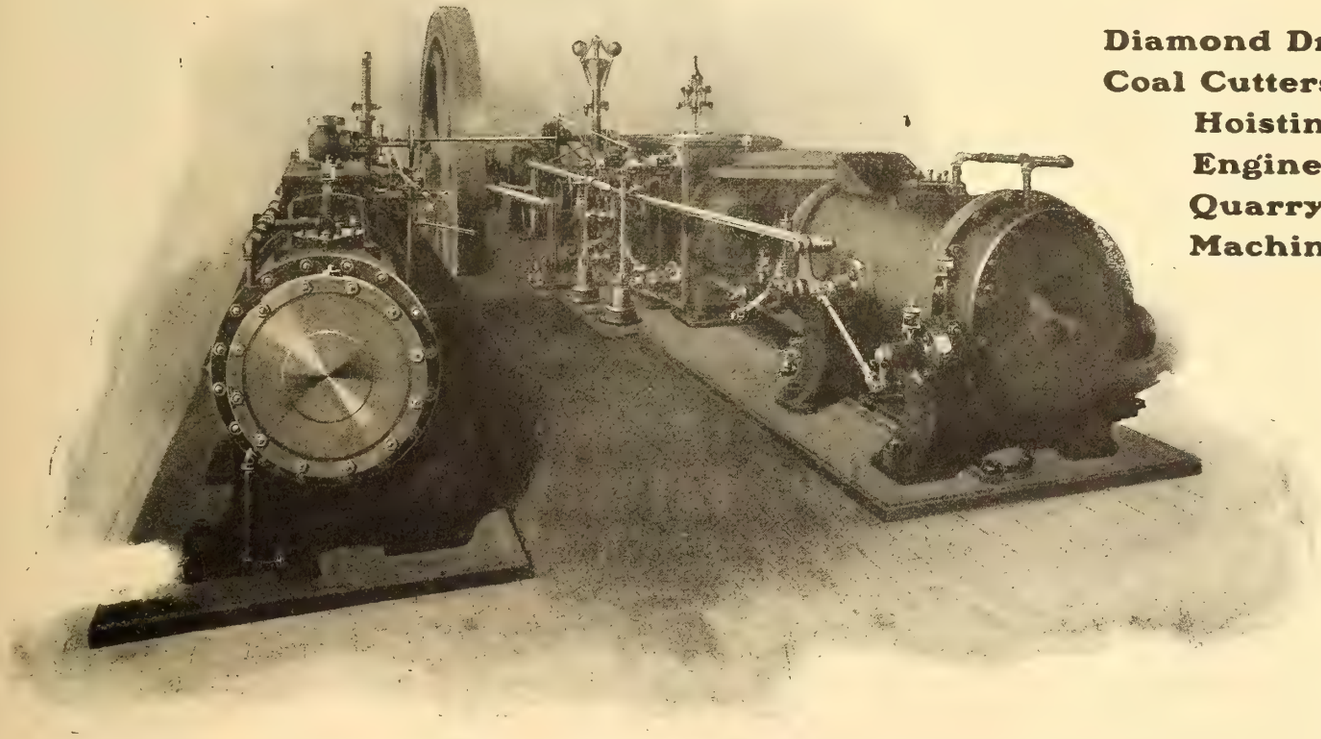

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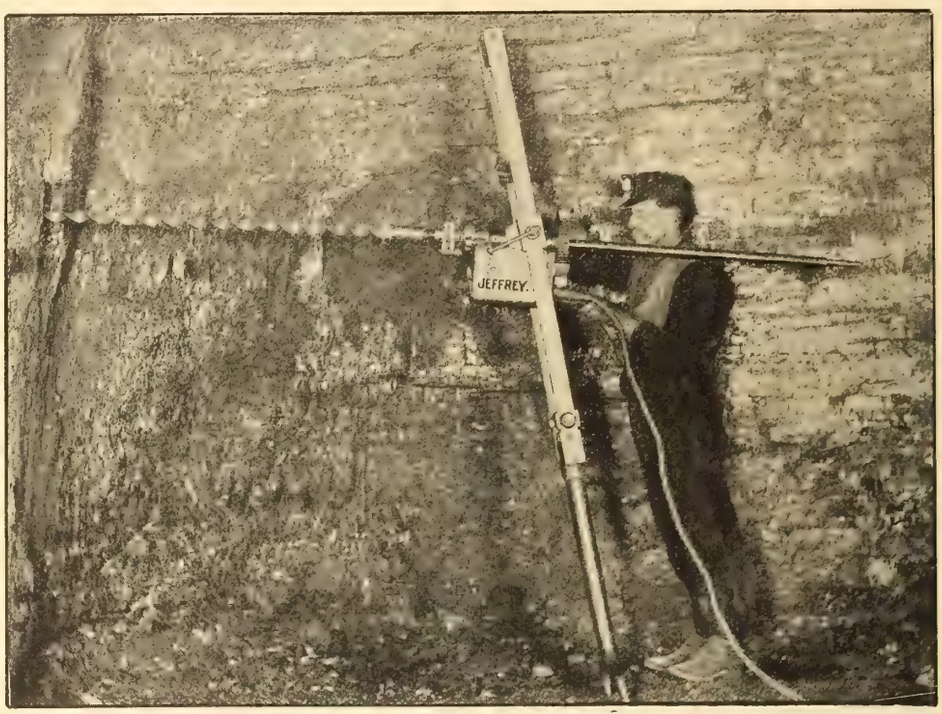

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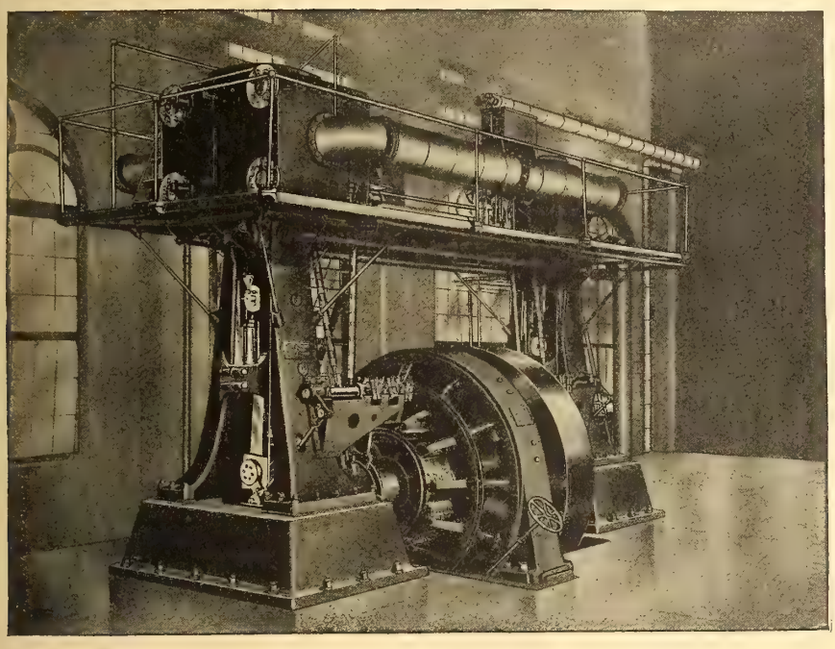

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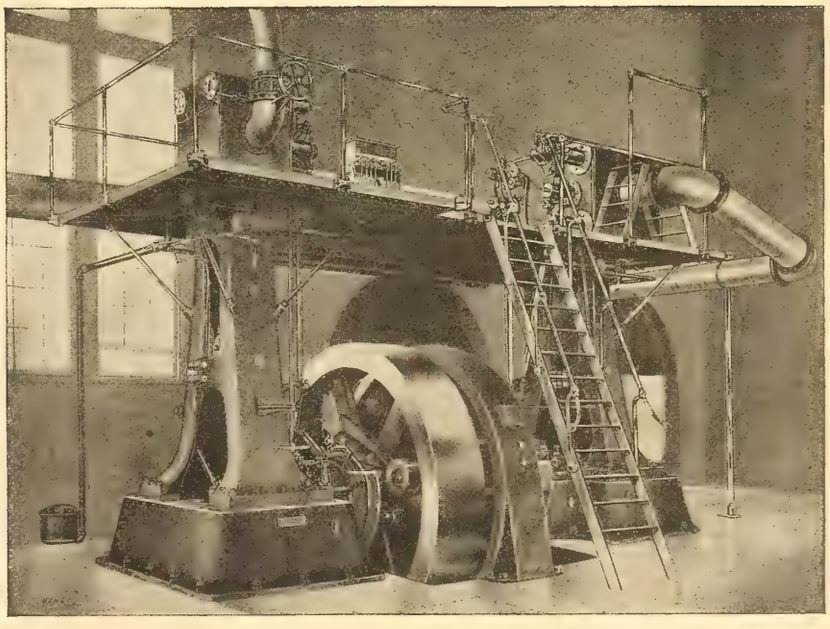

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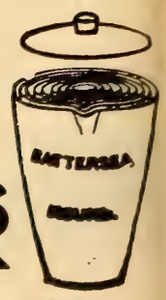

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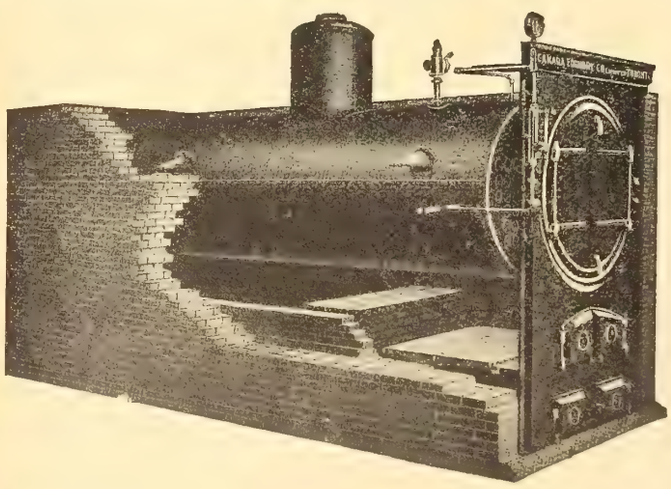

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THE PROPOSED ROSSLAND MINE CONSOLIDATION.

The Whittaker-Wright fiasco, in connection with the Rossland mines, is now a matter of ancient history, but nevertheless, the legacy that unfortunate man left behind him is still deplored, not only in this country, but by a very considerable section of the British investing public. Since Wright's death, the companies he promoted have, it is true, managed to keep afloat, but the handicap of over-capitalization, and lack of working capital, has been so great, that these concerns have been obliged to regard life as a mere struggle for existence rather than consider the feelings or the pockets of their shareholders. We confess, therefore, that we sympathize very heartily with the efforts that have been put forward recently by leading representatives of both Canadian and English interests in the Rossland mines to bring about a better state of affairs. How this might best be done has occupied a good deal of attention for some time past, and during the last year or so several praiseworthy attempts, to, for example, cheapen mining costs and by the introduction of new mechanical contrivances, turn to profitable account the lower grade products of the mine in that section have been tried. So far, they have not been particularly availing. If a man has suffered from such serious injury, by which it becomes necessary for him to undergo the amputation of a limb, it were mere foolishness to temporize with court-plaster. That is the case with the Rossland mines. The disease is deep-seated, and only drastic measures can succeed. Mr. G. S. Waterlow is not only a director on the Le Roi board, and a large shareholder in the Company, but, in addition, he is a man of affairs. He was, we think we are correct in saying, the first to grapple with the situation, and the first to suggest a reasonable and practical solution. That solution involved the amalgamation of a number of properties in the Rossland and Boundary district, all of which were seriously over-capitalized, and the formation of a new concern to acquire the respective interests after removing from their backs "that old man of the sea," debt and over-capital, from whose attentions they had also severely suffered. Mr. Waterlow, in the spring of 1904, laid his proposal before Mr. T. G. Blackstock, who controls the Centre Star and War Eagle interests. That gentleman, acquiescing in the arrangement, agreed that the only way by which a fair valuation of the respective properties which it was proposed should be consolidated, could be arrived at, would be the employment of a competent and independent engineer whose services would be retained to make a thorough examination and base his report on the actual amount of positive ore the mines contained, and the interests were sufficiently fortunate in securing the services of Prof. R. W. Brock, of the Geological Survey of Canada, to undertake the examination. After Mr. Brock had submitted his report, a consultation was recently held at Winnipeg, at which were present Mr. Waterlow, representing the Le Roi and Snowshoe mines; Mr. MacMillan, General Manager of the Le Roi Company; Mr. Cronin, General Manager of the Centre Star and War Eagle mines; Mr. J. W. Astley, Engineer of the Le Roi Company, and Mr. Brock. At least three of the gentlemen present at this meeting had no other anticipation than that the business before it was merely the discussion and adjustment, of minor points in connection with the proposed consolidation scheme. But the first intimation to the contrary was the fact that copies of Mr. Brock's report had al-

ready been sent out of the country by Mr. MacMillan, before they, as it had been agreed, could be discussed between the engineers and representatives of the respective interests. This, to begin with, caused a great deal of embarrassment, but it is rather astonishing to learn that a very strenuous opposition to the scheme came from Messrs. MacMillan and Astley, who absolutely refused to acquiesce in Mr. Brock's valuation.

Of course these gentlemen are entitled to their opinions, but it is a well known fact that Mr. MacMillan has no technical knowledge, while Mr. Astley has, unfortunately, been in a very bad state of health for some time past, and we think quite probably is thus less well informed on the position than he might otherwise be. It practically then amounts to this, that Mr. MacMillan is taking the estimate of his Superintendent, a man who is largely uneducated, though doubtless a good practical miner, in preference to the opinion of a thoroughly qualified engineer of high professional standing. In view of Mr. MacMillan's previous attitude on the subject of consolidation, one wonders if he can now be entirely unprejudiced. Necessarily, in a big scheme of this kind, there must be give and take on both sides, and we are afraid that there is not much "give" to Mr. MacMillan. Whether he will be strong enough to "queer" the proposal, remains to be seen, but we question it very considerably. So far as the Mining Review is concerned, we unhesitatingly state that this consolidation, if carried into effect, will be the very best thing that could happen to Rossland, while it is about the only chance shareholders in these undertakings have of realizing anything at all reasonable on their investments.

Apropos of the foregoing an esteemed correspondent writes as follows:—

In September, 1904, Messrs. F. W. Bradley and John H. Mackenzie, two men of exceptionally high-standing, resigned their positions as temporary consulting engineers for the Le Roi Company (they had agreed to act for Le Roi at the instigation of the Bank of Montreal), because of the action of the London Board in failing to follow their advice in matters of the greatest importance to the present and future of the Le Roi property. The London Board, in its decision to disregard the advice of these engineers, was influenced by the Managing Director, (now General Manager), Mr. A. J. MacMillan. Upon what grounds Mr. MacMillan was able to convince his directors and shareholders that his ability in complicated mining and metalurgical matters was superior to that of two thoroughly experienced technical and business men, has never been apparent; for at any rate, Mr. MacMillan has no technical knowledge, and his superintendent engineer has been Mr. J. W. Astley, whose ill-health for nearly a year, has been such as to prevent his taking any active part in the affairs of the Le Roi, so that Mr. MacMillan has depended for technical advice almost solely upon his mine foreman, who is now employed under the title of mine superintendent. But to come to the point of this letter: For some eighteen months, Mr. Geo .S. Waterlow, a Director of the Le Roi and Snowshoe, and Mr. T. G. Blackstock, representing the War Eagle-Centre Star, have been vainly endeavouring to bring about a consolidation of their interests, believing that that if the mines of Red Mountain, Rossland, which have produced some $30,000,000 in values, were worked as a unit, there would be sufficient savings in operations to pay dividends. That they have failed thus far, seems, from recent events, to have been largely due to the machinations of the same gentleman, who professed to favour consolidation, but who was, nevertheless, apparently quietly placing as many obstacles in the way of consolidation as he conveniently could.

The climax of this episode seems to have been reached at a recent meeting in Winnipeg, where Messrs. Waterlow, MacMillan, Astley and Cronin, held a meeting with Professor R. W. Brock, who had spent many months in making a most careful and exhaustive examination of the Rossland and Boundary properties, in the joint interests of the respective parties. It would have been difficult to have found anyone better fitted for this important work, as Mr. Brock's reputation for honesty and fairness are unquestioned, while his experience for a number of years as one of the chief engineers and geologists of the Canadian Geological Survey, has made him familiar with ore deposits and industries throughout Canada, and particularly with those of the Kootenays. But at the meeting in Winnipeg, Mr. MacMillan decided, based upon the evidence of his foreman, that Mr. Brock was correct in his report upon the Le Roi, but that he had misrepresented the Snowshoe, and had over-estimated the War Eagle and Centre Star to the extent of almost 100 per cent. Mr. James Cronin, who had just come from Rossland, showed that the War Eagle and Centre Star had shipped nearly as much ore as Professor Brock had reported in sight, and had far more ore still in sight than at the time of the examination, which was hardly the case with the Le Roi, where MacMillan, it is believed, is "gutting" ore bodies, and economizing on development, in order to make a showing which will be acceptable to shareholders who are not qualified to fully appreciate the position of affairs. But Professor Brock's reports, maps, and positive statements did not in the least embarrass Mr. MacMillan in backing the mine foreman as against Professor Brock, whose contentions are further supported by actual shipments to the smelters, but Mr. Waterlow, who had in former days supported Mr. MacMillan, declined now to uphold him. In consequence, Messrs. Waterlow and Cronin agreed to recommend to the Boards of their respective companies, consolidation upon the basis of Professor Brock's estimate of profits in sight in all the properties.

There is a comical side to all of this from an outsider's stand-point, but to the shareholders of the various properties, and to Rossland, it means much, for if Mr. MacMillan can continue to persuade the directors and shareholders to act upon his suggestions rather than those of Professor R. W. Brock, there is little hope of a renewed era of prosperity for Rossland or shareholders in the mines of that district. The present situation cannot continue long. Economies must be effected, and a large amount of consistent development work performed to make up for the limited amount done in the last few years.

THE ASSOCIATED SILVER-LEAD MINES OF B.C. AND THE LOCAL SMELTERS.

The Associated Silver-Lead Mines of B.C. have addressed a letter to the Hon. W. S. Fielding, Minister of Finance, at Ottawa, submitting an alleged comparison of smelting rates on lead ore as between British Columbian and European smelters. In the letter the Association states that they are prepared to substantiate these figures, and in view of the marked additional cost of smelting ores at home, as shown by the statement, prefer a request that the lead bounty be now granted on all exported ores of lead. The statement submitted to the Minister by the Association reads as follows:—

European smelters pay in full for the total silver and lead contents in the ore, charging an inclusive treatment rate of $8.60 per 2,000 lbs. (40s per 2,240 lbs.) added to the freight rate to Antwerp of $13 and some local charges amounting to 75c per 2,000 lbs.

B. C. smelters deduct 10 per cent. of the lead and 5 per cent. of the silver contents and make a marketing charge of 1c per lb, of lead, in addition to their freight and treatment rate of $15, of which at least $12.50 is for treatment.

Taking as examples a ton each of two average grades of ore, one containing 120 ozs. silver and 50 per cent. lead, and the others containing 35 ozs. silver and 65 per cent. lead, with silver at 58c and lead at $2.60, the figures work out as follows:

	35 ozs. and 65 p. c. Gross contents $54.10	120 ozs. and 50 p.c. Gross contents $95.60
Europe pays in full less:		
Treatment	$8.60	$8.60
Freight	13.75	13.75
Insurance	.35	.35
	$22.70 nets $31.40	$22.70 nets $72.90
British Columbia deducts:		
Treatment	$12.50	$12.50
5 p. c. and 10 p. c.	4.40	6.08
Marketing charge	11.70	9.00
Freight	2.50	2.50
Difference in exchange	.12	.12
	$31.22 nets $22.88	$30.20 nets $65.40

Loss to producer by selling in B. C.	$8.52	$7.50
Against which is bounty	9.75	7.50
Producers' proportion of bounty	1.23	Nil
Smelters' proportion of bounty	8.52	All

NOTE.—(1) If ore can be shipped to B.C. smelters in bulk and requires to be sacked for Europe, this would be about $1.50 per ton in favor of B.C. But such ore is rarely shipped in bulk, and bulk facilities for Europe will no doubt be available when requested. (2) Europe is prepared to pay for the lead on wet assay, a gain to the seller as against the fire assay on which the B.C. smelters buy, averaging fully $1.25 per ton.

The producers submit that the natural protection secured to the B.C. smelters by the difference in freight rate of $11.25 per ton of ore in their favor is full compensation for any increased expenses of smelting the ore and marketing the lead; that the penalties of 10 per cent. on lead and 5 per cent. on silver, still exacted by the B. C. smelters are now discontinued in Europe, owing to furnace methods which save losses formerly causing these charges and that the restriction of the bounty on ore mined in Canada to Canadian smelting has resulted in a monopoly which is diverting over three-quarters of the bounty from the producers to the smelters, and is practically putting a premium either on antiquated methods or in extortionate charges. If this restriction were removed and the producers of ore allowed to earn the bounty the immediate result would, by increasing the number of working mines, enormously stimulate the entire business of the country and further, would produce local smelting conditions whereby modern methods would take full advantage of the natural protection afforded by freight rates on ore.

While as yet we have had no opportunity of testing the accuracy of the foregoing figures, it may be very confidently asserted that, even presuming that the conditions are such that at present it would be more advantageous for the lead mine owners to ship their ores to Europe, provided, of course, the bounty was granted on exported ores, the feeling in British Columbia would in general disfavor the course which the Government is here asked to take, on the grounds that the proposal is economically unsound. When the bounty was granted on lead, the mine owners presumably went thoroughly into the question of smelting rates and apparently allowed the Government to understand that they had no particular cause for dissatisfaction on this score. In fact, it was largely due to the co-operation of the smelting interests, and the assurances the Government received that the granting of a bounty on lead would result in the upbuilding of the local smelting and manufacturing interests that the request for aid to the industry was accorded. As this information has reached us on the eve of our going to press, we must postpone, for the time being, a full discussion of the question, but it may be added that the Associated Silver-Lead Mines of B.C. is not a thoroughly representative organization of the British Columbian silver-lead interests, and it will be interesting to learn how those outside the organization view the matter.

THE RIGHTS OF SHAREHOLDERS TO INFORMATION.

We have read with much interest an address recently delivered before the Institution of Mining and Metallurgy by the newly elected President, Mr. Wm. Frecheville.

Mr. Frecheville, who, as an examining engineer has earned a well-merited reputation for sagacity and honesty, addresses his fellow members on the extension and increase of mining generally within the colonies of the Empire, and notes briefly the condition of the industry in India, the Malay States, Africa, Guiana and the Australian colonies. He also speaks with intelligence upon one or two mechanical questions which have developed in mining practice, notably the employment of electrically operated centrifugal pumps for lifting large quantities of water to high levels, instancing the installation of a pump at the silver-lead mines at Horcajo, in Spain, where

1,000 gallons a minute are raised from a depth of 1,450 feet, in four separate lifts.

But the point which Mr. Frecheville makes, and upon which we particularly desire to comment, is the duty of mining companies to give their shareholders more frequent and accurate information concerning the condition of their property. Mr. Frecheville (in spite of the recommendation of his counsel that the term "ore in sight" should be abandoned, and new terms substituted therefor), advances the argument that, in order to arrive at an estimate of the value of the mine, there are two important factors, one, the quantity of "ore in sight," or, as we would now put it, "positive ore," and second, the prospects for the future, or, as we would now put it, "the amount of probable and possible ore," and that the shareholders are entitled periodically to obtain a correct statement of the positive ore, and the closest approximation of the amount of probable and possible ore, believing further that the surmises, hopes or fears of the manager, as expressed in his periodical letters to the Board of Directors, should be given freely to shareholders that they may exercise their own judgment as to the market value of their shares, and dispose of them to the public, or increase their holdings, according to their points of view as influenced by these reports.

We conceive that the idea is susceptible of broad discussion, and of a considerable divergence of opinion. It has been our experience, and we fancy every engineer has a similar experience, that the average shareholder, in the main, is totally unable to form a correct judgment from the facts as expressed in the manager's periodical reports, which of necessity have to be couched in more or less technical terms. We fancy some of our English readers will admit that often-times the sole excuse for their consulting engineer being present at Board meetings is to interpret the language of the manager that it may be made understandable to the non-technical mind. If this be the case, what meeting of ordinary shareholders could be expected to correctly interpret the meaning of the manager's periodical reports? Mr. Frecheville notes this objection in his sentence "that it may not be wise to let the shareholder know too much, as he might be led to form hasty conclusions," but proceeds to give his own opinion that this danger is considered to be far more imaginary than real, and that if the shareholder did form hasty conclusions, and thereby suffer losses, it would be his own affair. This strikes us as rather a remarkable statement from one who is desirous that the shareholders should obtain the information which the directors get at the expense of the company, and which Mr. Frecheville previously had said would be of use to them in forming a just estimate of the value of their property. To the ordinary mind, the two conclusions, only a paragraph apart in the original, strike one as inconsistent. We submit, however, that if this detailed information contained in the manager's letters and which is often susceptible of misinterpretation by the ordinary shareholder, were given to the public as soon as received, that the opportunities for stock rigging and jobbery would not in any way be diminished, if anything the practice would be conducive to even greater abuses than at present.

Mr. Frecheville goes on to express the opinion that the shareholder is nervous and doubtful because he has no information, and that if this condition were altered and that he knew that all the letters, cablegrams and information on the matter of his property could be inspected at the company's office by any shareholder, he would be placed in a much more advantageous position. That Mr. Frecheville, however, recognizes, to some extent, our objection, is shown in a subsequent paragraph, in which he says briefly that, to get the full significance of the figures, measurements and facts, as reported by the manager, they must be "grouped, compared and commented on by some one." This shows that the Institution's distinguished President had in mind the points we have made, but did not apparently realize their full significance. If the mining engineer whose business it is to understand mines and reports, is often unable to form an opinion from them, how can it be possible for ordinary shareholders to derive any opinion or value from similar reports, until after they have been interpreted to them. The ordinary shareholder in a mining company is usually a man who has no technical knowledge, and who is quite unable to appreciate points which may make for increased value, or decreased value, in the manager's reports. The *raison d'etre* of directors is not alone the direction and management of the financial affairs of their corporation and the supervision of the employees of that corporation, but they also have duties towards their shareholders, a fact which is, on this side at least, but too rarely recognized. We submit that one of the duties of a board of directors is to conserve their property's interests, not alone at the mine but in the market, and that that conservation would not be in any way served by giving access to the public of all the doubts, queries and uncertainties of the property, as revealed by their manager's weekly, fortnightly or monthly report. Rather we believe that such periodical reports should be handed to the resident consulting engineer of the company, to be by him transcribed into understandable common business language, and then only published, if in the estimation of the directors the interests of the shareholders as a whole would be best served thereby. The English law puts the director in a position of trust, and holds him responsible for the proper administration of his property, and we can conceive of cases where directors, in making public the regular reports of their manager, might lay themselves open for impeachment and removal under the English statute.

While we recognize fully Mr. Frecheville's experience in mining and his authority as an engineer, we may perhaps be permitted to question the value of his advice in this particular instance. In this regard we are, however, quite prepared to recognize the infallibility of boards of directors, and the tendency observed in many of them to make money for their own pockets irrespective of the interests of shareholders, but this condition of things is not peculiar to mining companies but is common to all corporations whose public interests are confided to a board, and whose shares are quoted in open market. Against this feeling there can be no safeguard, so far as our knowledge goes, except the individual character and honesty

of each director. It is not going too far to say that the largest financial institution in Canada has had experiences of this nature whereby the directors, having knowledge of certain market conditions and future transactions, have been enriched and individually benefited by being in a position to take advantage of information which was first available to them in their official capacity. If Mr. Frecheville's point that all shareholders should be as fully informed as the directors, is made in the hope that thereby each shareholder would have an equal chance with the directors in taking advantage of market conditions concerning his particular property, we beg leave to disagree with him, for, apart from other things, the average intelligence of the shareholder is far below the intelligence of the director, and if given all possible sources of information to the same extent as his director he would be quite unable to avail himself of such information, by reason either of his more limited financial resources, or, more probably, by reason of his inferior intelligence. We make this last remark in the full knowledge that directors of English corporations are not of equal intellectual calibre, and that too often distinguished names are put upon the directorate for no other purpose than that of influencing the market, and without any regard whatsoever for the intelligence which these titled persons may possess. The topic of "guinea-pig" directors has been well and ably discussed for many years, and the point of our remarks is, that we decline to believe that Mr. Frecheville's recommendation would bring the relief to the shareholder which he indicates.

We are glad to note that Mr. Frecheville desires that the public (by which we suppose he means the shareholders) should be given free access to the workings of mines, and, as he suggests that to overcome or obviate the expense and loss of time incurred in taking visitors through the workings, those asking the privilege should be required to pay a small fee, say, two or three dollars, to an employees' accident fund, or some similar charitable object. Our esteemed contemporary, the *Engineering and Mining Journal*, will, we feel sure, take note of this Presidential address, and its distinguished editor, Mr. Rickard, will no doubt have something to say upon this important topic. Nevertheless, the conditions attending the operation and management of American mines, and by American we mean North American continent, are usually so much more business-like and clearer than the conditions surrounding the operation of a British owned mine, that perhaps what would be sauce for the one would not be sauce for the other.

THE EXTENSION OF THE SPRINGHILL, N.S., COAL FIELD.

One of the most important economic results that has ever been achieved from the researches and studies of the Geological Survey of Canada, is the authoritative assertion that the coal measures of Springhill in Nova Scotia extend southerly and westerly from that town, and cover an area of 200 or more square miles.

The late Sir Wm. Dawson, in his examinations of the Springhill field, allotted to the conglomerate which extends southerly from the mines a lower position than the coal, making the conglomerate basal to the coal, and hence it has always been assumed that boring or sinking below the conglomerate would be futile and non-productive of results.

During the last ten years, Mr. Hugh Fletcher has been carefully re-surveying and re-examining the coal fields of Cape Breton and Nova Scotia, and he found himself unable to accept as facts many of the data and conclusions of Sir William. Among other unaccepted statements was this one of the conglomerate being basal to the coal at Springhill; on the contrary, Mr. Fletcher believed it to be more recent than the coal, and, therefore, there was no apparent reason why the coal seams found at Springhill might not underlie this conglomerate.

Influenced by this conclusion of Mr. Fletcher's, a small number of coal men syndicated themselves for the purpose of sinking some deep bore holes to prove the truth of Mr. Fletcher's conclusions. At Newville, some twenty miles south from Springhill, a bore hole has cut 10 feet of good coal at a depth of 2,329 feet from the surface. The section at this hole shows 810 feet of red sandstones, belonging to the upper Permian, 1,500 feet of conglomerate, then 19 feet of carboniferous sandstone and then 10 feet of bituminous coal. As the coal gave no solid core, the exact dip of the coal seam is not known nor can its exact width be given.

This result has naturally produced a considerable comment amongst both coal men and scientists, and has added to the already very considerable weight of the crown which Mr. Fletcher has worn so modestly for many years. For Mr. Fletcher, to those who have known him, the result is but a well-earned honor due to his laborious, minute and painstaking researches in his beloved profession, but for the Dominion and especially for the mainland of Nova Scotia, the result is worth many millions.

The increasing depth of the Pictou county mines, causing increased costs, has handicapped them in their competition with Cape Breton mines for markets, and many industries of the mainland have relied almost entirely upon the Cape Breton coals. The discovery of this great asset in Cumberland County will redound to the credit of our Canadian Geological Survey as well as to the personal credit of Mr. Fletcher, and do much to relieve that branch of the public service from the common criticism that it has added nothing to the national wealth of Canada.

We note with much satisfaction evidence of the establishment of more intimate and friendly relations between the Canadian Mining Institute and the Canadian Society of Civil Engineers, an arrangement having been recently concluded by which the Institute has been accommodated with most convenient and comfortable quarters in the Society's building, No. 877 Dorchester Street, Montreal; and here, at any rate for the next twelve months, the Institute's Secretary will take up his official abode, while the Library, which is also to be housed in the same building, will be under his personal supervision. It is needless at the moment to more than casually allude to the antagonism which at one period existed between

the two organizations, for, if it has not quite disappeared, it is certainly now high time that it should. At any rate the new arrangement may be regarded as a treaty of peace, the original *casus belli* being no longer a matter of practical politics.

As most of the members of the Institute are readers of the REVIEW, it may not be out of place, now we are on the subject, to add a word or two in explanation of the reasons which induced the Council to accept and act upon the disinterested suggestion made by Dr. J. Bonsall Porter, of McGill University, who, by the way, is an active member of both organizations, that negotiations with a view to this co-tenantry arrangement be opened with the Canadian Society of Civil Engineers. One of the several important considerations then, was the desire to increase the value and utility of the Library to the membership at large by a plan which would admit of the circulation of books. It was felt that the Library had been of little value in the past to any but members actually resident at headquarters, and hence the proposal to place non-resident members on a better footing in this regard, by affording them the opportunity of borrowing such books, or publications as the Library contained, which met, generally with much favour. The difficulty, however, of carrying out this idea without injury to the Library as a permanent collection, appeared somewhat formidable, but this quite vanishes when it is explained that the Library of the Canadian Society of Civil Engineers, which members of the Institute have now permission to consult, to all practical purposes duplicates that of the Institute, and consequently the reference value of the Library will always remain intact. In addition, the Institute shares the use of a capital lecture hall, and, what will appeal to many, a smoking and lounging-room, comfortably furnished and generously supplied with popular illustrated periodicals. The rooms, moreover, are within a minute or two's walk of the Windsor Hotel, where our friends visiting Montreal usually put up, and the building is open from 9 a.m. to 11 p.m.—which is long enough for anyone.

Mr. John Stanton, a well known authority on copper, in a recent interview is reported to have made the following statement regarding existing conditions:—

"Copper conditions are stronger and healthier than they have been in past years. There is an absence of speculation and buying for the purpose of advancing prices. The export as well as the domestic demand for the metal is good. Exports for this month will be heavy and I should not be surprised if they reach 20,000 tons. China is taking large quantities of copper, presumably for coinage purposes. A large portion of the 40,000 tons taken by China recently has not been shipped. Shipments to the Far East extend over a long period, due largely to the fact that stocks on hand amount to practically nothing. In other words we have to make the copper before we can ship it.

"While I always seek to get the market price for my copper, I would not like to see quotations advanced. Under conditions as they exist to-day there is always a possibility of sharp advances, but prices at present are satisfactory to the consumer as well as the producer.

"The copper mines of the country are being worked for all they can produce, which is natural in view of the heavy demand which exists for the metal. The production of copper this year will show an increase in the United States and probably in other countries, as conditions are healthful all over the world.

"The steel industry is a good barometer of copper conditions. The demand for railroad supplies, new buildings, etc., is always followed by a good demand for copper."

Meanwhile few people realize what the advance of one cent a pound in the price of copper means to industry. In the case of mines such as those in the Boundary District, where large tonnages are produced, for example, the increase in the price of copper of 1 cent per pound is of the greatest significance. It may be safely said that improved market conditions this year will enable the Granby Company to pay a really substantial dividend, while, of course, all other copper mines throughout the country will be equally benefited.

The *Engineering and Mining Journal*, referring editorially, in a recent issue, to the uses of photography in mining, states that the first large coal mining company to reduce the practice to a system is the Delaware, Lackawanna and Western, who has appointed an official photographer, whose duty it is to make a complete graphic record of all new work showing progress from week to week. So far as we are aware, the potentialities of the camera for accurate mine record-making work have not been yet recognized in Canada, though photography is being utilized more and more by engineers in connection with mine reporting. Judiciously used, the camera may thus become a very valuable and faithful auxiliary, but it must also be remembered that the instrument is capable in unskilled or unscrupulous hands, of lying with the most unblushing effrontery. The best set of work-recording photographs we remember having seen in this country were made by Mr. W. Meredith, the Electrical Engineer in charge last year of the Vancouver Power Company's construction operations. A set of from four to eight views of the work as it progressed was made regularly every week, suitably mounted on grey paper, and bound up with a paragraph or two of typewritten explanation for the information of the Directors. The progress of the work from start to finish was thus illustrated in the most understandable fashion, with a consequent saving of much laborious report writing which, at the best, would have conveyed a less lucid idea of what was being accomplished.

There has been some talk of the employment of Mongolian labor, to replace white labor, in the operation of hydraulic mines in the Atlin district in British Columbia. It will be remembered that some years ago a number of Japanese were taken into the district for that purpose, but the Local Miners' Union was then sufficiently strong to induce the mine operators to abandon their project. It is learned, however, that

conditions in this regard have since changed somewhat, and the same opposition would therefore not be brought to bear. At the same time it is rather questionable whether this means will be taken to cheapen labor costs in this northern mining camp, but rather the problem will be solved—in fact it has already been partially solved—by the introduction and application of new methods of mining. Thus there can be no doubt that in the future, gold recovery in the district will be made largely by means of dry land dredging, an initial undertaking of this character having already given promising results, while, too, this season, steam shovels are to be, for the first time, utilized.

It is very gratifying to learn that satisfactory financial arrangements have been made to carry on the work which has been for so many years past courageously undertaken to develop the ancient river channel systems at Slough Creek and elsewhere in the Cariboo district. Some months ago Mr. J. D. Kendall, a well-known mining engineer, at one time resident partner in Vancouver, of Messrs. Bewicke, Moreing & Co., was retained to examine the Slough Creek properties, on behalf of the promoters of the undertaking, who have since taken the property over. Mr. Kendall's report was eminently favorable, and as he has the reputation of being most conservative in his opinions, there is every reason to believe that this enterprise will be carried to a successful issue.

With the rapid development of electricity in metallurgy the possible improvements and applications of that force in the field of electro-metallurgy are very great. It behooves the metallurgical and the mining engineer to keep himself in touch with the results that are being almost daily chronicled, since some of these are bound to shortly be adapted to ordinary practice in concentration and metallurgy.

A NEW MINERAL AREA IN ONTARIO.

By John E. Hardman.

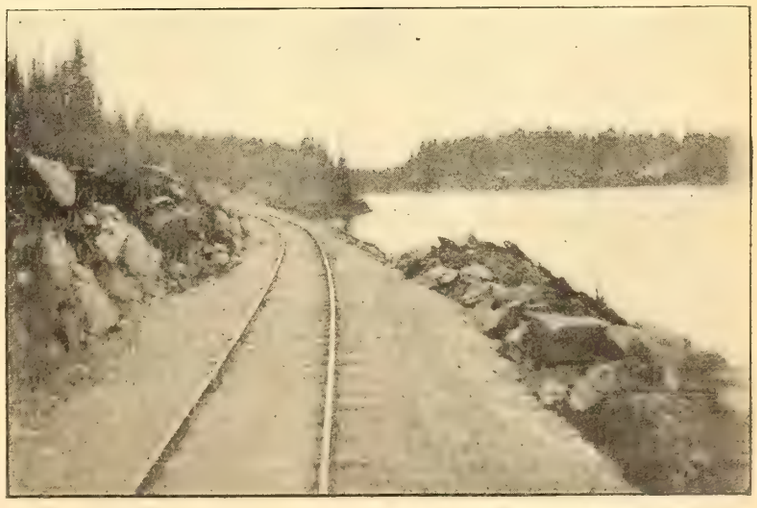
The discovery of ores of cobalt, nickel and silver, with which metallic silver is associated, has during the last 18 months, attracted considerable attention to that portion of Northern Ontario which lies north of the C.P.R. track at North Bay, and west of Lake Temiskaming.

The mode of discovery of these deposits has already been noted in the April issue of the Review, but as yet nothing fully descriptive of the region and its deposits has made its appearance in print. The following notes gathered during a brief visit of inspection may therefore be of interest:

The Temiskaming and Northern Ontario Railroad, an Ontario Government undertaking, starts from the town of North Bay on Lake Nipissing, and, running north-easterly for 10 or 11 miles through the township of Widdifield, turns through an angle of 90 degrees and pursues a general north-north-west course for over 50 miles through a country which is almost entirely gneissic (Laurentian) in character. For 53 miles this great stretch of Laurentian gneisses is traversed by the road until the southern end of Rabbit Lake is reached, when patches of slates, felspathic sandstones (greywackes), granites and breccia, with areas of diabase and gabbro interjected, are found for about 30 miles. Near the middle of this area the railroad touches the north-east arm of Lake Temagami at Temagami station. For the 60 odd miles of its line to this station no minerals of economic importance have as yet been noted, nor are they likely to be found in the gneisses of the Laurentian country.

View on the T. & N. O. Railway.

At Temagami several small steamers ply to distant points on the lake and will act as feeders to the railway from the numerous promising mineral prospects which have already been located and some of which are now being vigorously opened. The region around Lake Temagami is rich in surface showings and gossan, and the occurrence on the north-east arm of outcrops of iron ore, both magnetic and hematite, banded with red jasper, promises the ultimate discovery of iron ores of commercial value. Near Vermillion Lake in the slates and sandstones of Huronian age, Major R. G. Leckie is opening a deposit of mispickel and pyrrhotite carrying gold values. For some ten miles after leaving Temagami the road traverses this formation, then meets with acidic granites which follow the line for eight or nine miles, and in which there is little of mineral interest; passing through this area diabases, quartzites and breccias of the Huronian again come in and continue to New Liskeard.



North-east Arm of Lake Temagami, from the Railway.

The lower Huronian of the present day is lithologically quite different from the Lower Huronian of the time of Sir Wm Logan. Instead of being a series of aqueous sediments,

altered by heat and by compression, it has been found that many of the beds of this age are composed of volcanic dust and ejectamenta. Besides quartzites, slates, conglomerate and felspathic sandstones, we have breccias, shaly sandstones and coarse agglomerates.

ANOTHER VIEW OF THE LINE.

Here and there occur patches of greenstones, and other igneous rocks more or less disturbed and folded, and the series generally has been marked as Keewatin, in which mispickels and pyrrhotites are found carrying some gold. Sasaginaga and Clear Lakes are both completely surrounded by this series of rocks, and the sixth, seventh, eighth and ninth lots of the fifth and sixth ranges of Coleman Township seem to be worth careful prospecting.

At the 102 mile post on the railway, one comes in sight of Cobalt Lake, or "Long Lake" as it was called before the present discoveries of cobalt-silver ores were made. This pretty sheet of water is about ⅞ of a mile in length, by ⅛ to ¼ of a mile in width. The town plot, having the shore line for its south eastern boundary, has been made to the north and west of Cobalt Lake, covering about 250 acres of land. The Temiskaming and Northern Ontario Railway have built a half mile siding here, a pretty station house and a neat section foreman's dwelling. A general store and one or two dwelling houses are at present the sum total of the town, but a small hotel to accommodate transient mining men is much to be desired, since the nearest place where a bed or a meal can be gotten is the town of Haileybury, about five miles distant.

From the station platform can be seen, barely half a mile to the south-westward, the buildings of the McKinley-Darragh mine, while just across the Lake to the south-east are the buildings on lot 404, belonging to the Earle properties, now known as the "Nipissing Mining Company," and a quarter of a mile to the north-east, the steam from the Timmins mine is noticed rising above the curve in the railway track, going towards Haileybury. A quarter of a mile distant to the northwest is J. B. 7, the property of Mr. W. G. Trethewey, which is not visible from the station because of an intervening hill. These four properties have, up to the 1st of May, 1905, and since the 1st of January, 1904, shipped and sold $640,000 worth of silver, cobalt, nickel and arsenic. The biggest shipper has been the Earle, or Nipissing Company, with a record of over $300,000; the Timmis is second and the Trethewey third. The average of all shipments has exceeded $1,000 per ton in values, which values have been paid for.

The bulk of this large sum has, of course, been in metallic silver, to which sulphurets of silver (argentite, stephanite and polybasite) have added largely. At first somewhat good prices were obtained for the base metals, but now cobalt, instead of bringing 72 cents a pound, yields only 40 cents; nickel 12½ cents, and arsenic ½ cent per pound of metal contained in the ore. The silver brings New York quotations, less the deduction of 10 per cent., which, considering the high values in silver which the shipments have contained, means a very substantial profit to the purchasing firm.

THE AUTHOR, MR. HARDMAN, EXAMINING THE TRETHEWEY PROPERTY IN THIS REGION.

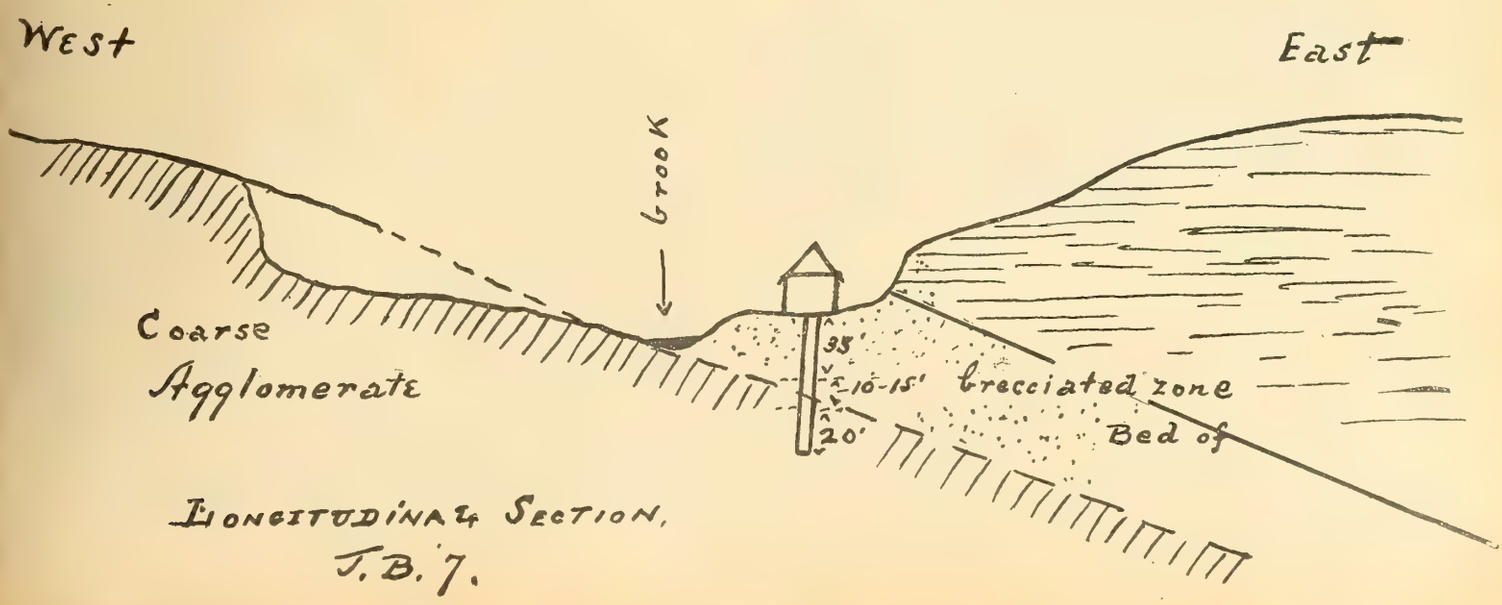
The prior discovery of the district is the Timmins property, or J. S. 14. On this location occur two seams or veins both carrying cobalt and silver, but having a divergent strike. The one runs S 70 E, the other north-east and south-west.

On the latter vein a shaft has been sunk to a depth of about seventy feet, the vein retaining its size and carrying high values in silver to that depth. At the time of inspection the property was being equipped with a steam plant and an air compressor, and mining operations had been suspended. The production of the mine has exceeded one hundred and fifty thousand dollars up to the first of May, 1905.

Almost due west from the Timmins property, and about three quarters of a mile distant in a straight line, is the property of Mr. W. G. Trethewey, J. B. 7, on which but one vein has yet been found, but that one has produced in excess of one hundred thousand dollars. These two properties north of the lake are the deepest and most extensively worked in the district. The accompanying illustration gives a photographic view of the shaft-house, and of the large open cuts on either side of it, which are found on Mr. Trethewey's property. The vein was first discovered by Mr. Trethewey at the point marked with a letter "A" in the photograph. It was opened by stripping and an open cut, and showed a width of about six inches and values approximating $1,500 per ton. A shaft was then begun and sunk on the dip of the vein (which is nearly vertical) to a depth of about thirty-five feet when a flat slip or zone of broken matter was encountered. This broken matter continued for ten or twelve feet and carried little patches of ore scattered through it, but comparatively little metallic silver. At a depth of fifty feet this broken matter disappeared and the vein appeared again in the country rock, solid and unchanged in size, but carrying little or no silver. The vein had apparently crossed from the foot-wall to the hanging wall, lost its silver but retained its values in cobalt. The formation below the slip-seam was one of the characteristic agglomerates of the region, whereas, the formation above it to the east was a fine grained pyro-clastic rock which was submitted to Dr. A. W. G. Wilson, of McGill, for microscopic examination. Dr. Wilson reports the constituent minerals to be angular grains of quartz, plagioclase and some orthoclase which is frequently decomposed to muscovite. Associated with these three minerals are small grains of biotite, magnetite and secondary epidote, the whole being cemented together by chlorite. The rock has a dark green color with spots of black which the microscope shows are aggregates of biotite and chlorite. The structure is micro-crystalline or felstite and the rock is probably a rhyolite or andestitie, tuff. The following sketch will illustrate the conditions just described.

On the Timmins property the vein still continues associated with this pyro-clastic rock and the dump affords many specimens of it. On the Earle property, No. 404, the same two divergent series of strikes was observed. On the Wright property (No. 269) and on the two forty acre lots belonging to the Messrs. Drummond, of Montreal, the strike of the cobalt veins was, in all cases, S. 70 E. On the Wright property, which shipped a car load of ore in April having a value of between fifteen and twenty thousand dollars, this same fine grained vol-

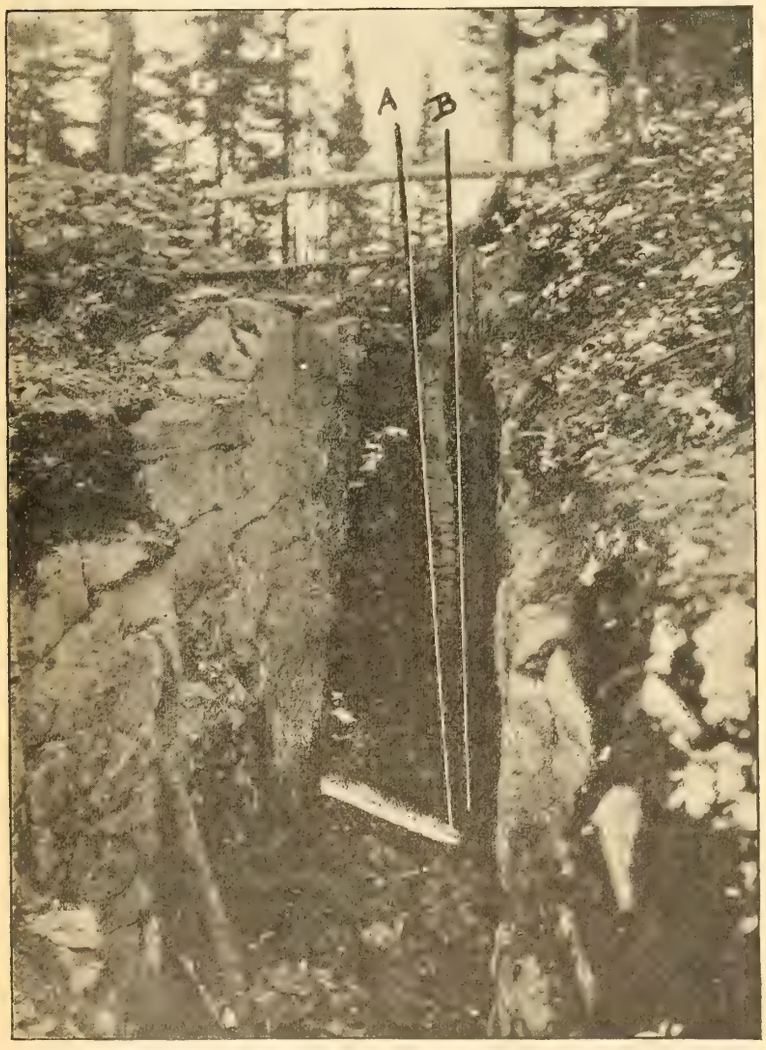
SHAFT-HOUSE AND OPEN CUT AT TRETHEWEY MINE.



LONGITUDINAL SECTION,
J. B. 7.

canic was noticed. But it was not observed on some of the other locations round Kerr Lake.

The veins so-called, consist of a series of "spaces of discission," almost vertical, and which have subsequently been mineralized for widths which vary from a fraction of an inch to eight or nine inches; there are some wider crevices (a series of seams sometimes extending to a width of nearly six feet) but the filling is chiefly rock matter, the smaltite and niccolite rarely having a greater width than three to four inches. Professor W. R. Miller has more specifically described the igneous rocks as breccia-conglomerate and agglomerate with which are interpolated bands of a silicious rock called by Sir William Logan, Huronian Slate. His term "slate" was applied to a rock which is really composed of minute grains and fragments of rocks of various kinds which have been consolidated and more or less altered; they are fine grained and delicately laminated rocks, but they are not argillites, on the contrary, they are decidedly silicious. Professor Miller, who has carefully

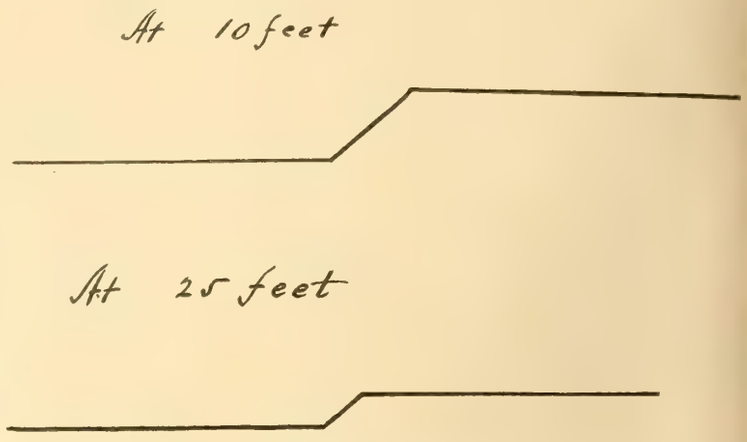


View of Big Open Cut at Wright Mine.

studied this region and made many sections, says that the series of slates represent ash rocks in which are found fragments of orthoclase, plagioclase, trachyte, chlorite and calcite.

The fractures by which the veins have been formed seem to have been due to two forces acting in directions inclined to each other at angles varying from 120 to 160 degrees. In many cases the minor fracture has become obliterated. The diminution of the secondary fracture is shown in the accompanying photo of the Wright Mine, 269, where the convergence in depth of the two lines, marked A and B, is most noticeable, and the extinction of the east and west running seems very clearly shown.

This extinction is often marked by a wall which is curved rather than straight.



The very high values which have been realized from these ores have attracted much attention from capitalists and miners. The available area of Coleman Township has been blanketed with locations, but many are to be investigated before the commission, and will probably be located.

(To be continued.)

THE KINGSTON SCHOOL OF MINING.

By Prof. J. C. Gwillim.

The twelfth annual meeting of the subscribers of the Kingston School of Mining shows that there were 345 students taking classes in this Institution; 162 of them were engineering students.

The Mining School is affiliated with Queen's University; closely in touch with it in every respect as to interchange of classes and fellow feeling. The buildings being all grouped on a fine site overlooking Lake Ontario, the students of Science, Arts, and Medicine are thus brought together in the class rooms and in every phase of University life. In the Mining School, or Faculty of Practical Science, there are eight courses now well provided for in accommodation and instruction, although the rapid growth of this faculty will soon call for more room and equipment.

These eight courses are:—

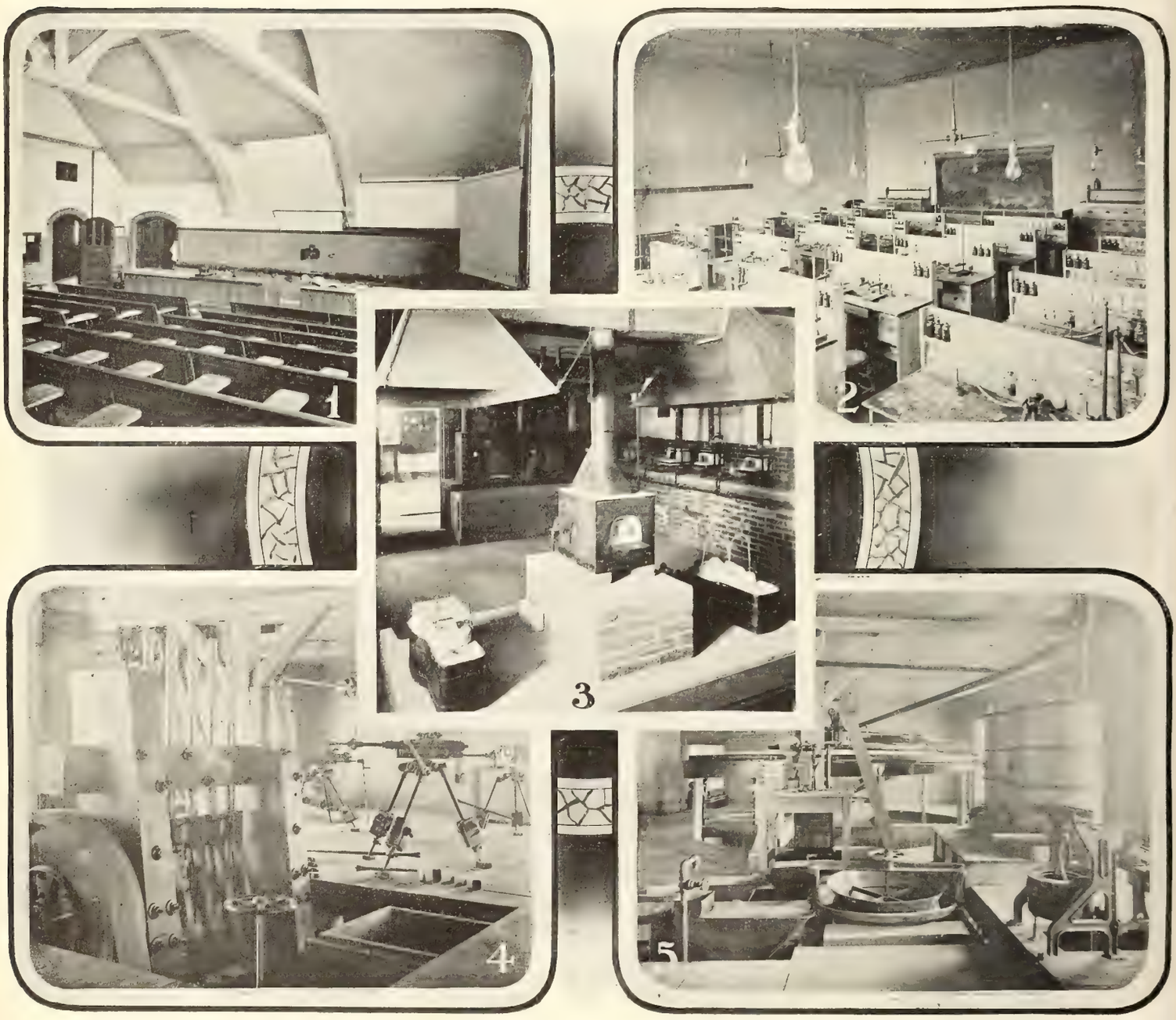
Mining and Metallurgical Engineering;
Civil, Electrical, Mechanical, and Chemical Engineering.
Chemistry and Mineralogy.
Mineralogy and Geology.
Biology and Public Health.

These courses are four years' each, the first year's study being common to all, so that a student during, or after, his first year my recognize his inclination or talent and proceed to the course best suited for him. The degree of B.Sc. is given alike for any one of these courses.

The Province of Ontario, which contributes to the support of this Mining School, makes it possible for many students to gain a practical science training, who, otherwise, could not afford it. Such students appear to form the best material for some engineering professions and can here find a combination of circumstances which make it possible for them to gain a degree. The fees are light, and living expenses less than is usual in university towns, the cost per session not being over $250.00, with a minimum of consider-

ENGINEERING AND CHEMISTRY BUILDINGS, SCHOOL OF MINING, KINGSTON.
(See article on page 98.)

GEOLOGY, MINERALOGY AND PHYSICS BUILDINGS, SCHOOL OF MINING, KINGSTON.
(See article on page 98.)



LECTURE ROOMS, LABORATORY, ASSAY AND METALLURGICAL ROOMS AT THE KINGSTON SCHOOL OF MINING.

(See article on page 98.)

ably less. It is possible, and it is quite common, for the students to put themselves through on their own earnings.

Until lately the Province of Ontario has given nearly all of the engineering students, but during the last two or three years a considerable number are coming in from the West, and some from the States. The West has no efficient Practical Science School, and its men are forced to come East for training; transportation to and fro is a heavy cost—nearly as much as the cost of the session.

The C. P. Ry. and the G. T. Ry., however, have this year given much reduced rates to *bona fide* students living in the West, or desiring to work during the summer season there. This is a considerable help and a wise policy, for no better material could be introduced into the development of the country.

Concerning the equipment of this School, it may be said that Mining and Metallurgical Engineering have a very fair and useful mill with laboratories and draughting room of their own. The allied departments of Geology, Chemistry, Mineralogy and General Engineering have each their own buildings and equipment, the first three subjects being especially strong, as they have been longer building up. Recently the Civil Engineering Department has been much developed, also Electrical and Mechanical Engineering, so that each has a course of its own, quite complete, and benefited by association with all the other courses of the University.

In the mill and laboratories tests are made each year upon such ores as appear to offer instructive work in milling or concentration. These ores come principally from Ontario, but small lots from British Columbia and other long distances can be accommodated owing to the facilities given by the C.P.R. and their special rates given to mining schools.

To those who may have ores which afford an interesting problem in milling or concentration, it may be said that we are ready to do what we can to experiment upon them at very reasonable rates. As a rule, people are slow to appreciate the benefits of this work, which entails very little effort on their own part.

Milling Laboratory, School of Mining, Kingston.

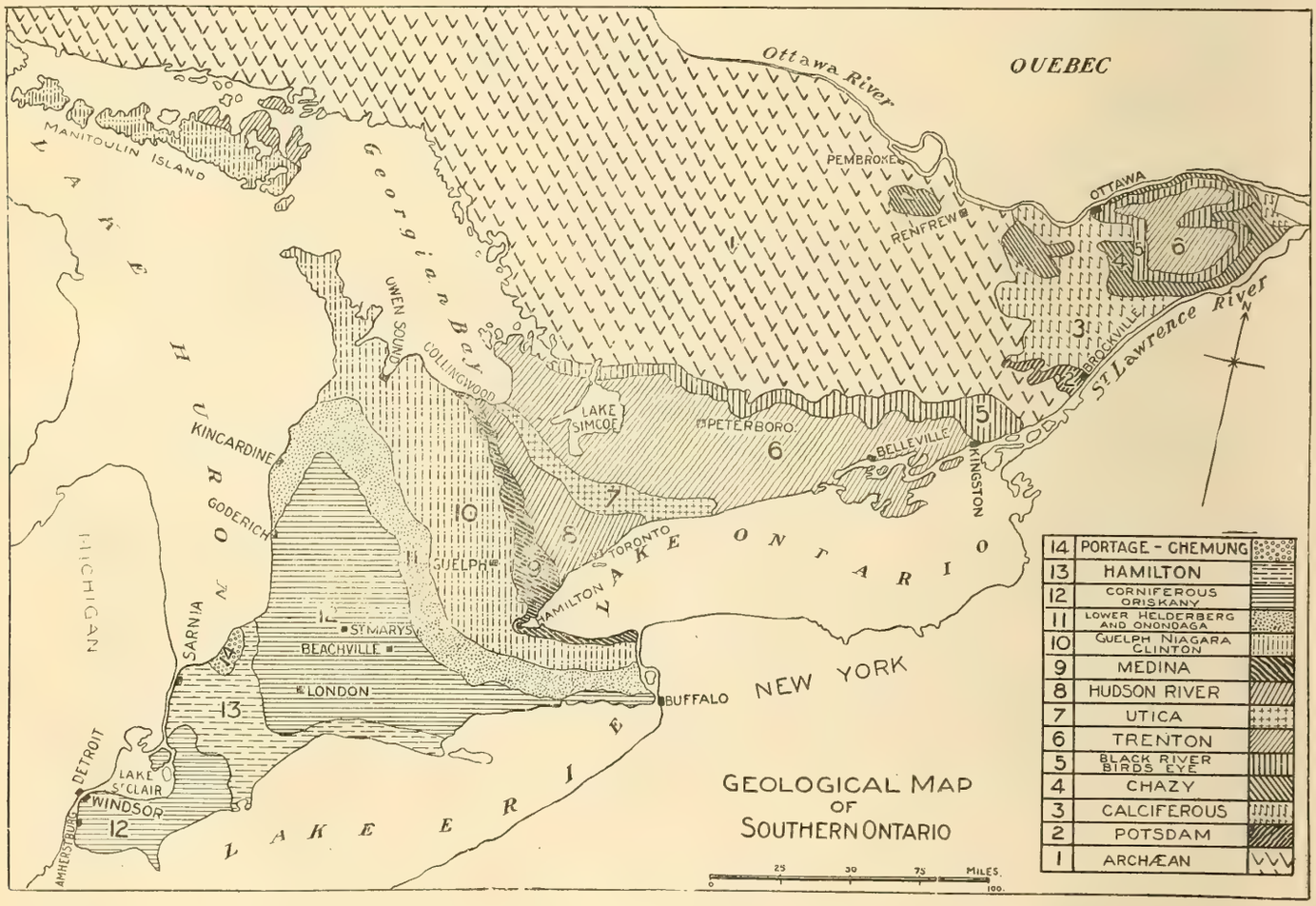
It is expected that the present growth will continue with a corresponding increase of opportunity for students in the practical world. Up to the present time the increase in opportunity appears to quite keep pace with the material turned out, and it is believed that the mining community is not yet surfeited with trained men at positions which are as well paid as other professions.

LIMESTONES OF ONTARIO.

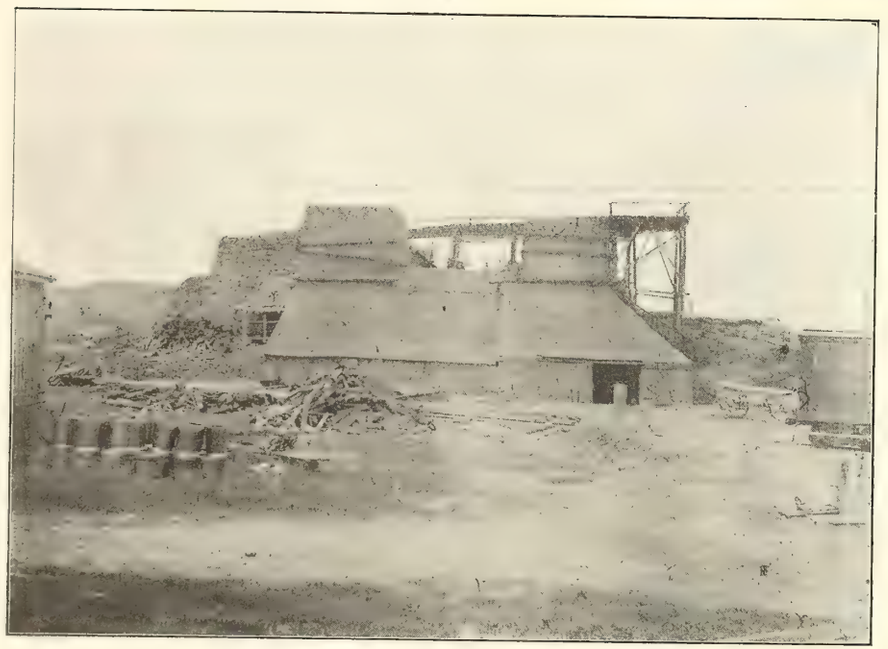
The Ontario Bureau of Mines has just issued a report compiled by the State Geologist, Prof. Willet G. Miller, on this subject, the Bureau having received during recent years frequent inquiries as to whether limestones of suitable quality for various industries were to be found in the Province. As Mr. Miller, in his introductory report remarks, the industrial value is in general very imperfectly realized, and it is not widely known that during recent years a number of important industries have either come into being, or have been perfected, which depend on limestone as a base.

On the uses of limestone we excerpt the following from Mr. Miller's report:

"Although the quantity of rock used in some industries is not in itself of great money value, still it is impossible for certain works to be established in a locality where limestone of suitable quality cannot be obtained at a satisfactory price. Industries that were not dreamed of twenty years or less ago are now firmly established. One of these is the manufacture of calcium carbide, which has developed into a world-wide industry. Ten years ago the manufacture of Portland cement was but a business almost unknown on this continent. It has now become one of the greatest in America. In Ontario much capital has been invested in it, and well-situated deposits of marl and limestone are eagerly sought for. Then, within the last two or three years several beet-root sugar factories have been built in the Province. These require lime of a very pure quality. Our wood-pulp industry is also a growing one, and it is believed that it will in time add much to the wealth and prosperity of our population. The sulphite pulp process requires a limestone high in magnesia, of quite different character from that used in the manufacture of beet-sugar. Our smelting industry is also becoming greater yearly, and limestone suitable for certain smelters sometimes has to be sought for at a distance, e.g., limestone occurring near the town of Renfrew has been found to be of the quality required at Sudbury, and has been quarried and shipped thither. In the varied industries in the vicinity of Sault Ste. Marie limestones of three or four kinds are required, One quarry has been operated on an island in Georgian Bay and two others were purchased in the State of Michigan. If we had had a fairly complete knowledge of the limestones situate adjacent to the Ontario shore of Lake Huron, it is probable that it would not have been necessary for the company to go out of the province in order to find this part of their raw materials. It is believed that this province has vast undeveloped iron deposits. Some of these are situated within easy access of the great lakes, and the ore can be shipped without difficulty. Other deposits lie at such a distance from water routes that if they are to be worked the ore will have to be smelted on the ground, and the fuel must be charcoal. In reducing wood to charcoal, valuable by-products are formed. One of the most important of these is acetate of lime. In the preparation of this material a pure lime is required. Thus it is seen that, in the manufacture of charcoal iron, limestone is required, not only for smelting the ore, but also in the preparation of one of the wood distillates. As there are very few occurrences of ordinary solid limestone in some of the more remote northern parts of the Province, it would seem that some of the marl deposits in lakes and marshes are likely to become of economic importance.



QUARRY OF GRAY DOLOMITE, ANDERDON, SHOWING FLOOR OF HIGH GRADE LIMESTONE. ESSEX COUNTY.



BEACHVILLE LIME KILNS. OXFORD COUNTY.

GRAY DOLOMITE BLUFF, ANDERDON QUARRIES, SHOWING DEBRIS FROM QUARRYING BLOCK STONE. ESSEX COUNTY.

LIMESTONES OF ONTARIO.

(Reproduced by kind permission of Ontario Bureau of Mines.)

ST. MARYS QUARRIES. PRODUCT USED FOR BUILDING, AND WASTE ROCK FOR ROAD METAL. OPENING IS 200 BY 400 FEET, AND 20 FEET DEEP. PERTH COUNTY.

LIME KILNS AT SHERKSTON QUARRY, USING NATURAL GAS AS FUEL. WELLAND COUNTY.

E. HARVEY'S LIMESTONE QUARRIES AT ROCKWOOD. WELLINGTON COUNTY.

LIME KILN AT LIMEHOUSE. HALTON COUNTY.

LIMESTONES OF ONTARIO.

(Reproduced by kind permission of Ontario Bureau of Mines.)

power, our limestones should be considered as being among our valued assets. An accurate knowledge is required of them for use in those industries which are capable of great expansion in the province.

At the present time the value of the products of three or four of our industries in which the rock plays an important part, represents about 20 per cent. of our total annual mineral production of over $13,000,000. Limestone has as great a bearing on the wealth of other countries.

The following is a list of manufactures and industries—arranged in alphabetical order—some, of course, consuming only a small amount of lime, in which limestone is used as a raw material: Acetate of lime, agricultural uses, ammonium sulphate, beet sugar, bone ash, building stone, calcium carbide, carbon dioxide, cement (natural and Portland), chalk chloride of lime, as a dehydrating agent, disinfectant, in dyeing, gas manufacture, glass, furnace linings, lime for mortar and whiting, lime pencils used in the oxyhydrogen light, lime water, lithographic stone, marble, as a polishing material, potassium dichromate, pottery glaze, for preserving eggs, etc., pulp and paper making, as a chemical reagent, silicate brick, smelting of iron, lead, etc., soap, soda manufacture, tanning.

In Ontario very little use has been made of the crystalline limestones which are adapted to decorative and monumental purposes. At the present time, so far as known, only two quarries are worked for marble. The marble used in this country nearly all comes from the large quarries of the United States. Although there are in the province native varieties that are as good, trade prejudices favor the imported article.

Referring to the uses in Ontario of limestones for fluxing purposes, Mr. Miller states that owing to greater cost in some localities of obtaining stone carrying a high percentage of calcium carbonate, rock high in magnesia is often utilized, while crystalline limestone from the town of Renfrew has been used in the smelting and refining operations at Sudbury.

Mr. C. B. Fox, M.A., chemist and metallurgist at the Hamilton Steel & Iron Company's plant, reports that dolomite quarried in Wentworth County has been used for several years in the company's blast furnaces. An average analysis of this stone is:—

	Per cent.
Silica	.75
Alumina and ferric oxide	1.00
Lime	30.24
Magnesia	20.18
Phosphorus	.021
Sulphur	.050

In the Steel Works, calcium carbonate is used for desulphurizing and removing the phosphorus from the steel in the open hearth process. This has an average analysis of:—

	Per cent.
Silica	2.00
Alumina and ferric oxide	1.10
Lime	51.00
Magnesia	1.10
Phosphorus	.015
Sulphur	.05

Mr. Fox adds:—

"This calcite stone comes from the vicinity of Port Colborne, on Lake Erie, the nearest point to Hamilton at which calcite stone is found, all the limestone of our mountain being dolomite, with silica running from one-quarter of one per cent. up to six or eight. If the silica runs above three per cent. it hardly pays to use it here.

"It is generally conceded by blast furnace men that dolomite stone takes more fuel than calcite when used in a blast furnace, and calcite is generally supposed to be more efficient in the removal of sulphur. When smelting lean ores requiring a large amount of flux (i.e., where the proportion of ore to stone is lower than 3 to 1), the slag is liable to be dark and spongy, and difficult to handle when dolomite is used. On the other hand, it is claimed for dolomite that it prevents sticking and hanging in a furnace, and causes the stock to descend more easily.

"We have had samples of stone from a quarry at St. Mary's, which shows the stone there to be a calcite of about the same purity as that from Port Colborne."

In keeping with the object of this report, which is to show where limestones of various chemical compositions are to be found in the province, and with a view to assist those who are in search of raw materials of particular kinds, quite the bulk of the volume before us, the preparation of which has manifestly required an immense amount of labor and research, is taken up with a detailed classification and description of localities in which limestones occur. Hence with the information afforded, and by the aid of a map also contained in the report, the searcher for stone of a special chemical composition should have no difficulty in locating areas in which suitable outcrops occur. The report is a further testimony to the good and practical work for which the Ontario Bureau of Mines has already established a reputation.

THE STRATIGRAPHY OF THE CASCADE COAL BASIN.*

By D. B. Dowling.

(By permission of the Acting Director Geological Survey.)

Previous to the uplift of the Rocky Mountains all that part of the continent had for ages suffered but little from earth movements except, perhaps, a shallowing of the sea from Carboniferous times. There is little if any deposit to mark the lapse of time between the Carboniferous and the earlier stages of the Cretaceous, but the succession of the beds indicate no physical break. During most of the Cretaceous time the sea does not seem to have maintained any great depth, but shallow water conditions are marked at its inauguration, at about the middle period and again toward the close. This was followed by fresh water inundations, probably in the form of large lakes in which were deposited the Tertiary beds of Alberta.

The shallow water periods of the Cretaceous also show intervals of emergence during which land conditions prevailed and vegetation flourished. As the elevation of the land was not greatly above the sea, frequent inundations followed and the vegetation was covered up to be gradually changed to coal beds. We have thus three horizons that can be considered coal bearing in the Cretaceous.

1. The lower part of the formation—called the Kootenay series. Typical sections of this are given in the Crow's Nest Pass, as well as in several of the Rocky Mountain coal areas and in the Queen Charlotte Islands.
2. The middle portion of the formation—The Belly River series. This is exposed between Lethbridge and Medicine Hat, on the Belly River, and on the Peace River near Dunvegan. To this we may refer probably some of the seams that are exposed in the foothills near the outer range of the mountains.

* A paper read at the March meeting, 1905, of the Canadian Mining Institute.

3. The upper part of the Cretaceous—the Lignite Tertiary of early nomenclature. In Northern Alberta this is now known as the Edmonton series and it probably is continued south as the St. Mary River beds.

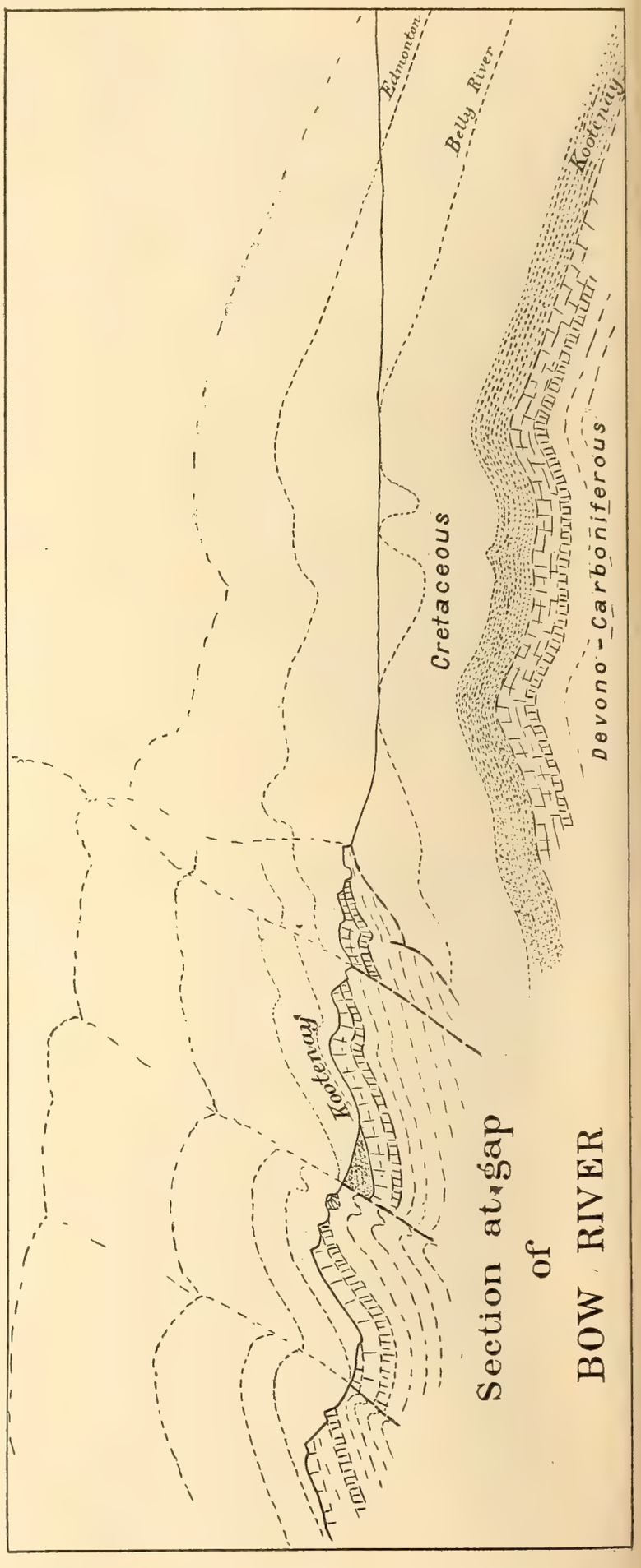
This last division furnishes coal over a large area reaching from Manitoba to near the mountains. In Manitoba these rocks occupy the summit of Turtle Mountain in the south. In Assiniboia, or the new Province Saskatchewan, they underlie portions of the Cypress Hills and cap Wood Mountain and the Coteau, and occupy a shallow syncline eastward through which the valley of the Souris is cut and from which much of the lignite consumed in the eastern section is obtained.

The one with which we are at present interested is that first mentioned—the lower part of the Cretaceous, the Koo-

Prospective of model of Cascade and Bow Valleys, looking about N.N.W. It shows the Bow River from below Canmore up to Banff, and also a part of Cascade River. The coal-bearing rocks occupy a somewhat narrow belt along the western part near the centre of the valley. The topography is obscured a trifle by the geological coloring.

tenay series, as it contains the most ancient and therefore, we might say, the best quality of coal. It owes its exposure here altogether to the uplift of the Rocky Mountains and is found to the west of the outer break of the range. This outer break has been of such dimensions that the uplifted beds on the west exposed the lower rocks as low down in the series as the Cambrian, and these latter rocks are found thrust up over those of the middle Cretaceous to the east of the fault. At the gap of the Ghost River, Mr. McConnell observed an overthrust of over two miles, and estimates the total there to be nearly seven.

A rough diagram of the section as observed at the Bow River Gap from near Cochrane to the valley of the Spray River, will help to place before the eye the disposition of the beds after the various fractures. The amount of displacement of the outer fault is conjectural in so far as concerns the thickness of the lower portion of the Cretaceous. Faint lines



to show the amount of eroded material are added, but it must be remembered that the breaks which are so sharp through the limestones probably when continued upward through the softer rocks vary much in character and were compounded or even ran into folds before reaching the surface. The original surface line would probably represent the section of an undulating elevated plateau.

Three blocks of the model in perspective to show structure of the field northward from Bankhead. Coal seams are indicated by broken lines.

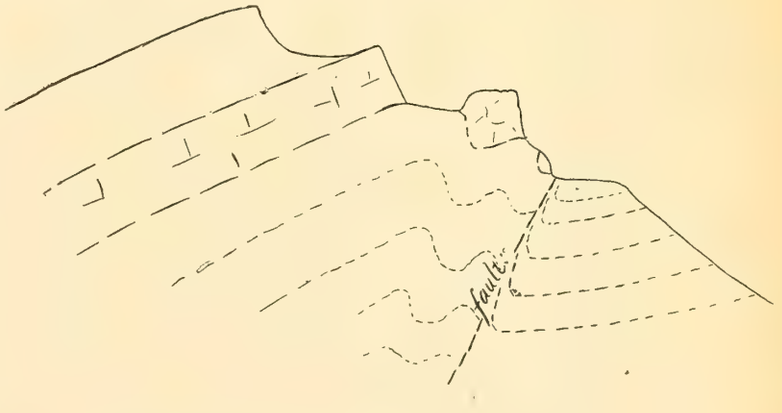
The general elevation here has been much greater than farther south in the vicinity of the Crow's Nest Pass and the denudation consequently of a more pronounced nature, so that remnants only of the softer rocks above the limestones are left in the broader longitudinal valleys. The section will also help to illustrate what is meant in such a statement as —If a few thousand feet less of these rocks had been swept away, we would have here what would compare, very favourably, for a coal producing area, with that at Blairmore and Frank. The section across the measures at the latter place to the north of Grassy Mountain resembles very much one drawn here, about three thousand feet higher than the present surface.

The preliminary study of the rocks of the Cascade basin, which is here the first and most prominent of the remnants of the Kootenay rocks inside the first range, led Dr. Dawson to speak of it as a basin or trough. This is true for a small portion of the area near its northern end, but for the major part, the break at the west is of the nature of a fault, and much of the coal producing rocks have been overridden by the rocks thrust up from the west.

A study of this break shows that the primary folds did not attain such great dimensions as are generally given for mountain structure, but were rapidly sharpened up and the break in the limestones was attended by little folding. The upper members of the series thus affected have since been removed, so that a study of the complete fault line is impossible. The general line followed by the fault apparently is near the crest of the anticline. In the Cascade basin, however, there is an example of the break leaving one fold and running to another. At least the deflection in the general line of the fault would look somewhat like this, as the continuation of the fault line from the Kananaskis along the front of the Rundle range would strike near the centre of Cascade Mountain where there is distinctly showing on the face of the mountain an anticlinal fold, and its continuation along part of the Rundle range has been traced. This has been figured by Dr. Dawson as proof of the complete downturn of the limestones beneath the Cretaceous trough, but there is room for but a small portion of the beds.

Northward of Cascade Mountain the break gradually changes to a fold with perhaps a small break in the beds between the crown of the anticline and the bottom of the syncline. The hills forming the continuation of the Cascade Mountain are anticlinal ridges with a trough of Cretaceous along either margin.

South of the Kananaskis river the Cretaceous beds dip to the southwest and run under the limestones brought up by the fault. On the height-of-land, between this stream and the Bow, the slope of the beds becomes less and very little of the coal-bearing rocks seem to have been over-ridden, and the limestones abut directly against the ends of the beds. They have in consequence sustained a severe pressure, and the lateral movement of the mass has been taken up by a series of flexures in both the limestones and the coal-bearing sandstones. The former are crumpled in a series of waves running nearly parallel to the fault line by which the beds away from the fault become more elevated in a series of steps. This can be seen in the peaks called the Three Sisters—three peaks in line back from the fault, at successively higher elevations. The lower and more easterly one is a remnant of a syncline in the beds which form the centre one. These folds continue south to the foot of Wind Mountain, and seem to pass beneath it and may continue still farther.



Section at Three Sisters Peaks

In the Cretaceous in front of this part the beds are not very much disturbed, except near the contact, where they are crumpled and seem to be brushed up along the fault line. These comparatively disturbed beds occupy a partly dissected plateau south of the Three Sisters and on the height-of-land to the Kananaskis, a strong fold is seen to accompany the change to the monocline structure. This is well marked in the upper beds, which are coarse sandstones and conglomerates, and the fold is seen to run from near the fault line north

of Wind Mountain, southeastward, on a line which carries it gradually higher and away from the fault. In the lower beds of the series it is thought that the fold will be less marked, and in the angle contained between the fold and the fault, there is probably a sharp anticline. Northward from here to the Cascade Mountain, the Cretaceous is overlapped by the limestone from the west, but a series of flexures in the coal-bearing measures are found in the Canmore mines, which

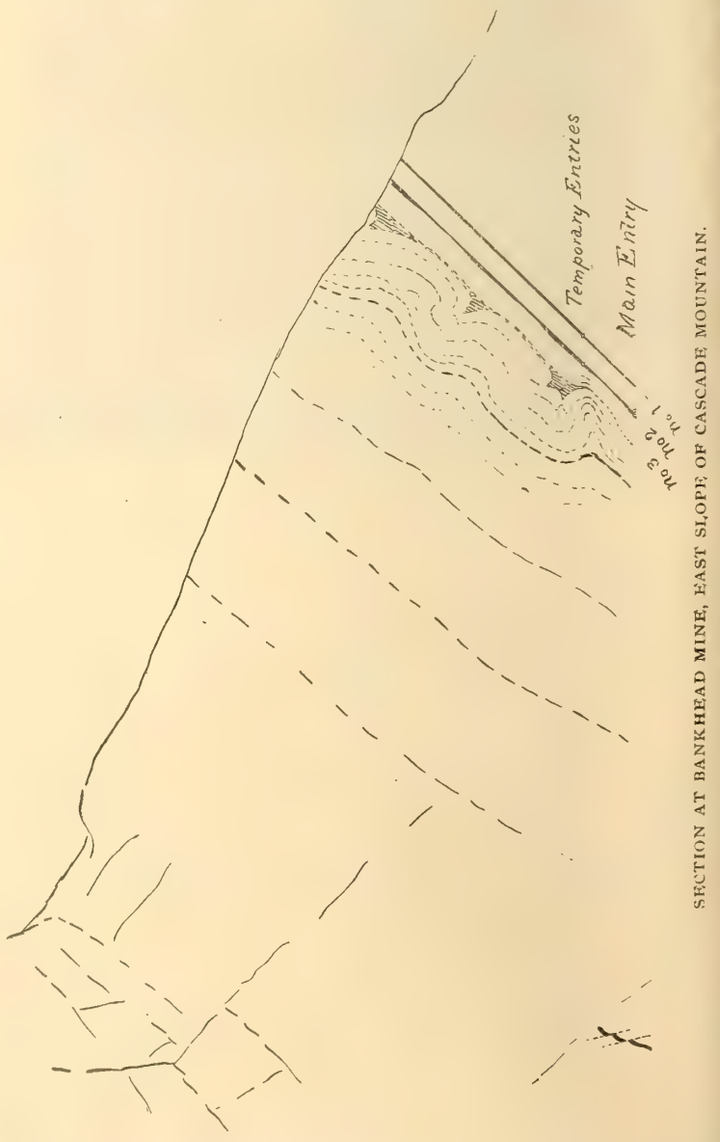
SKETCHES OF THE CRETACEOUS PLATEAU BETWEEN THE BOW AND THE KANANASKIS RIVERS.

The upper one is looking across the valley of the Kananaskis southward, and shows the coal-bearing beds dipping beneath the limestone. The foreground in each shows the limestone abutting against the Cretaceous, forming a fold in the latter by the pressure.

are probably continued along in front of Rundle Mountain, and seem to indicate that the direction of pressure was not at right angles to the fault, but more from the west. As the sliding of the limestone was upward along the fault, a series of waves in the coal seams might have been expected running parallel to the fault and not far from horizontal. Those found, however, have a pitch downward toward the south. A possible explanation may be deduced from the fact that the fault line in the vicinity of Anthracite is deflected to the north and then gradually dies out or is changed into a fold with less displacement. This gives us then a pivotal point on which a large block can be assumed to have swung. This would allow of a sliding of the limestones upward in a direction at right angles to the direction of the folds.

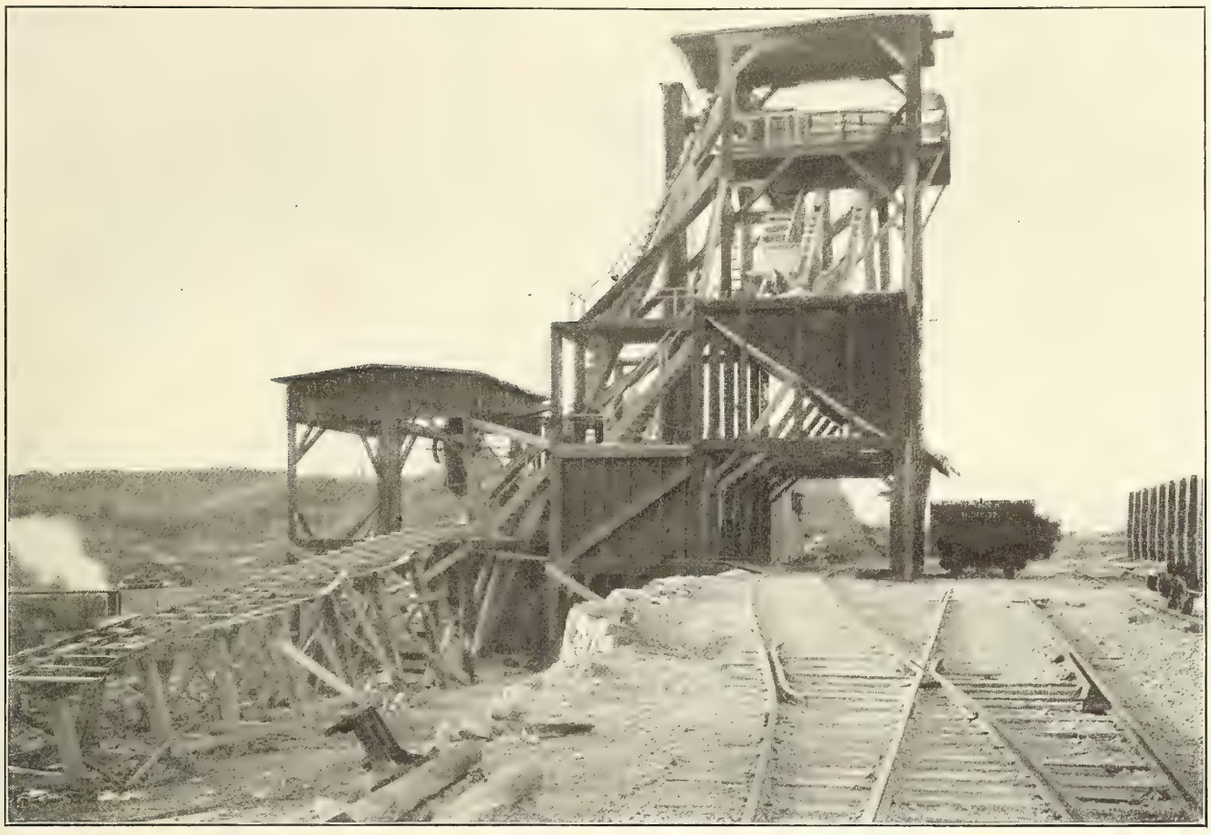
The part of the field thus affected extends from between Canmore and Anthracite southeastward to the foot of the hill below the Three Sisters. The beds east of a line running north and south through the town of Canmore are not much disturbed. To the west of this line they dip downward and pass through a series of waves as already noticed. At Anthracite the seams do not appear to have been affected by this series of small waves, but there is instead a much larger fold pitching downward in nearly the same general direction but at an easier angle. Mining operations commenced here on the beds dipping down into this fold, and on account of the great denudation in the valley of the Cascade River at this point the beds could not be safely followed down through the trough and over the saddle on the far side, without running into the water-laden gravel of the river. In the northern part of the mine, where the trough was shallower, the western upturn showed a slight bending toward the west, and this if it could have been followed far enough, would have led downward into the seams in the rest of the property. The sandstones below the coal can be traced northward to cross the Cascade River, and it seems rational to suppose that the coal seams above should do the same. The mining operations were continued only long enough to extract the coal from the seams within the fold, and little prospecting was done on the northern and larger part of the property. That the seams continued north past the fold is abundantly proven in the prospecting done on the measures north of the Cascade River by the C. P. Ry. The strike of the beds changes after passing Anthracite, but remain fairly constant for about five miles from the crossing of the Cascade, with a general dip to the west of 45 deg. or 50 deg., but here the beginning of a shallow syncline is found, and before the end of the Cascade Mountain ridge is reached the coal-bearing beds run into the fault line. As the valley of the Cascade River narrows up, less of the Cretaceous rocks remain, and at the northern end only the dark shales below the coal-bearing measures are left. As the whole of this area is taken up by the C.P.R., it is intended to work it all from the south end, following the seams on an entry but little above the Cascade River.

The southern end of this field consists of a monoclinal block of Cretaceous dipping to the west, partly over-ridden by the limestone of Cascade Mountain. This overthrust has made some impression on the rocks composing the block. The two lower seams on which work is progressing now are well protected by heavy beds of sandstone, and the shearing

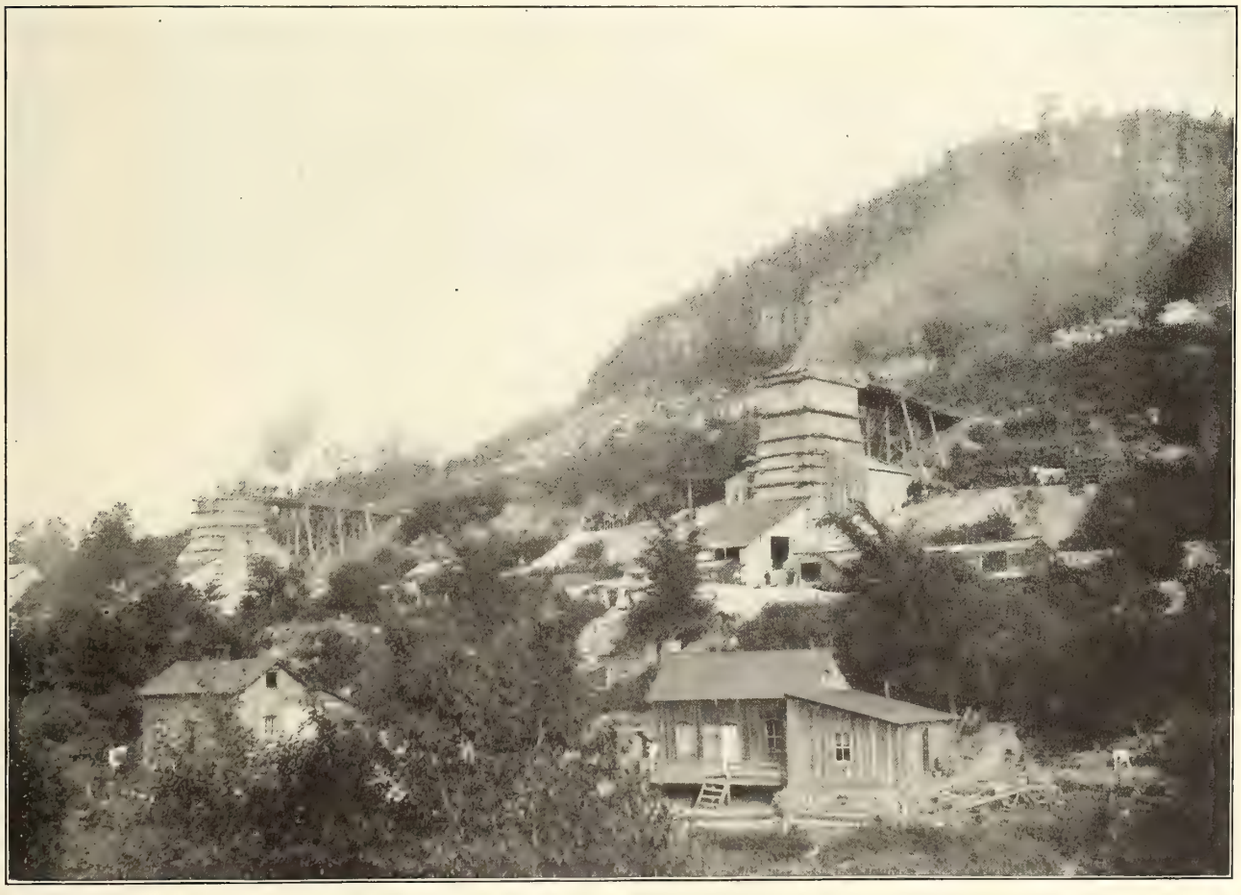


SECTION AT BANKHEAD MINE, EAST SLOPE OF CASCADE MOUNTAIN.

and pressure of the overthrust has caused little damage to the coal. The one above has suffered much more, owing no doubt to weaker covering beds, and there is evidence that there has also been sliding and bending of the overlying rocks. The sliding plane seems to have been mostly along the plane of seam No. 3.



PLANT FOR CRUSHING LIMESTONE AT ANDERDON QUARRIES. ESSEX COUNTY.



D. ROBERTSON & CO.'S LIME KILNS, 2½ MILES NORTHWEST OF MILTON. LIMESTONE BEDS FOR BURNING ONLY ARE IN BACKGROUND ON HILLSIDE. HALTON COUNTY.

LIMESTONES OF ONTARIO.

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THE HON. FRANK OLIVER,
who succeeds Mr. Sifton as Minister of the Interior.

In the beds immediately under the mass of the mountain little crumpling could take place, and the beds must have slidden bodily or in sections at different planes. In the beds at a distance from the overlying mass some relief could be had by the beds crumping up in front of the load. The rolls thus made would at the sliding plane be filled with broken material, and there would be a local thickening of the series along the face of the overthrust mass. The folds at Canmore are probably of this origin, but there are some in the beds at Bankhead that can be directly traced to this cause. In the prospect work at the top of the hill half a mile north of the mine, No. 3 seam apparently showed 100 feet of coal. This afterward was found to be but a mass of broken coal occupying a triangular area in vertical section. The foot wall was not disturbed but the roof had been forced back to nearly a vertical position, and below, the seam was continued with a thickness of only about five feet. In a cross cut to this same seam at the temporary entry on No. 2 seam the rocks were apparently undisturbed till No. 3 was approached, then the dip increased and the seam was found standing vertical, and farther on the dip reversed and where work was stopped the rocks were nearly horizontal. This points to a possibility of the tunnel passing beneath another of these rolls or pockets of broken coal. The foot wall of the mass was smoothed and showed small horizontal ridges, as though from the lateral pressure. Another example of buckling in the beds was observed on the walls of a gully five miles north of this place, but it can not be correlated with the same seam as at the mine. It probably is in somewhat higher beds, and if so there is some reason to think that No. 3 may as it is traced in the mine, prove to be workable in its northern part.

The effect of this buckling on the coal seams above the plane of sliding will be to form a series of waves such as are in the Canmore mine. Other sliding planes may, however, be found, but they are as likely to be in the thin bedded shales as the coal seams and will there cause no great amount of damage.

The work so far at Bankhead has disclosed two very regular and little disturbed coal seams, perhaps the best feature of the coal-field. The smashing of No. 3 seam is probably at its maximum at the south end and may diminish northward. The rolls do not seem to be horizontal, as the disturbance which is noted near the entry on No. 2 dies away farther in, but it must be admitted that the tortuous course pursued by this gangway at the entry is attributed to the proximity of a cross fault which divides the range to the east along the valley of Minnewanka Lake, and helped to make the great break between Mounts Rundle and Cascade. The section across the measures at the mine is emphasized to show the probability of portions of No. 2 being thinner opposite the extra pressure points of No. 3 or thickened by the relief of pressure opposite the pockets. One of the points where extra pressure might be expected would be between the two entries or below the temporary works. The state of this seam is no doubt already known, as there is being a slope put down on it at the mine to meet the main entry.

The thickening or apparent increase in the thickness of the measures caused by the crumpling of the strata is probably confined to the unloaded portion, and near the fault line the measures may be expected to increase their dip. A coal seam was found just under the foot of the mountain, and as it was of soft coking coal it was determined to test the seam by going down on it by a slope. Instead of a steep dip the seam started at the normal but bent downward and was carried still farther by a series of small faults which appear to run along in front of the mass of the mountain. By this series of steps the dip was increased to about 80 deg. This seam appears to be too close to the fault plane and is probably too much crushed to be profitably worked, but there seems to be no reason to suppose that higher up it may not have some portions that will be all right.

The two lower seams are of semi-anthracite, very nearly as hard as those in the old mine at Anthracite, but from the samples taken from the outcroppings of the higher seams along the hillside softer coal will probably be found, and after the cross entries are finished the shipments may include anthracite, steam coal and coking coal. The seams at Anthracite are slightly harder, but it must be remembered that the mining there is all from below what in this section is the main entry. I need not point out the great advantage there is here in having such a great body of coal above the entry.

It may be asked, how is it that as these beds are in regular ascending order above Carboniferous limestones, the age assigned to them is so much later than the Carboniferous? Is there not a chance that they are really the upper part of the Carboniferous, or near the age of the coal measures of Nova Scotia? The answer is that in the shales below the coal of this area Belemnites and Ammonites, with a few other shells known to be Cretaceous or Jurassic, have been found. The plants also that are associated with the coal bear but distant relation to the fern trees of the Carboniferous. At Anthracite and Canmore there have been recognized five species of ferns that have survived with slight change to the present day. Of the allied species, Cycads and Conifers, which can hardly be traced back as far as Carboniferous times, eight are found and all are related to modern types.

A NEW MINISTER OF THE INTERIOR.

Elsewhere in this issue, we print a portrait of the Hon. Frank Oliver, who recently succeeded Mr. Sifton as Minister of the Interior. Mr. Oliver is a native Canadian, having been born in Peel County, Ontario, in 1853. He went to the North West at an early period in his career, and was for a number of years employed as a printer in the office of the *Free Press*. Before the rebellion he went to Edmonton, where he established the *Bulletin*, which he still owns and conducts. In 1883 he was appointed to the North West Council and was elected to the Legislative Assembly in 1888 and continued a member until 1896. At the general election of 1896 he was elected in the Liberal interests for Alberta to the House of Commons, and was re-elected in 1900, and again in 1904. At the general elections last November, he defeated his Conservative opponent, Mr. M. Macaulay, in the new constituency of Edmonton by a large majority and at the recent bye-election he was returned by acclamation.

PROSPECTS OF CANADIAN COAL.

We quote the following extremely able article from our esteemed contemporary, *The Colliery Guardian*:—

"The improved outlook in Canada cannot fail to have a beneficial influence upon the coal industry, and a more prosperous time for colliery owners may be expected. This hopeful condition is reflected from all sides, and nowhere more prominently than in the iron and steel industries, which appear to be emerging from the depression of last year. The report of the Nova Scotia Steel and Coal Company for 1904, which has recently been issued, shows that a wave of depressed trade during last year resulted in a reduced sale of iron by the

amount of 156,000 tons, but, on the other hand, the quantity of coal raised was considerably in advance of the output of the previous year, although prices had been low in consequence of the severe depression which had prevailed in the iron and steel trades in Europe and America. Since the beginning of 1905, however, a marked improvement has set in, prices have advanced and consumption has increased. The same story is revealed in the report of the Dominion Coal Company, which, moreover, records a considerable falling-off in business with United States customers in 1904, owing to the reimposition of the coal duties. There was also a loss of profit due to the payment of duty on shipments to the New England Gas and Coke Company.

"The history of the Dominion Coal Company is instructive to all who are watching the development of Canadian industries. Formed in 1893, there was, in the first year of working a total profit of over $300,000. Last year—that is, after about ten years' work—the net proceeds of sales of coal and income from other sources amounted to $1,620,475 which represents a very satisfactory development in so short a time, especially in view of the fact that all has not been by any means plain sailing, and the company has had more than one set-back of considerable importance. Of these mention may be made of the disastrous fire which broke out in 1903 in Dominion No. 1 Colliery, to extinguish which the waters of the Atlantic had to be admitted and the workings flooded. Pumping operations extending over a whole year were necessary to pump out the mine. The experiment tried in 1902 of leasing the concern to the Dominion Iron and Steel Company turned out to be of somewhat doubtful advantage, and a new agreement has now been entered into whereby the Coal Company undertakes to supply the Iron and Steel Company with fuel under more favorable conditions than those fixed by the leasing agreement, whereby it was possible for the Steel Company to call for an unlimited supply of coal at times when prices were barely remunerative.

"The most noteworthy feature of the report, however, is the result of the investigation which has been made of the company's property and prospects by Messrs. Emerson Bainbridge and George Blake Walker. These gentlemen, after an exhaustive examination of the Dominion Coal Company's properties in Cape Breton, find that:—

"1. The company possesses a combination of properties of great and unique value, with special advantageous conditions: (a) An immense proved and working coalfield, with enormous reserve areas, which will be worked by future generations; (b) a very large capacity of output; (c) thick seams of good quality at moderate depths; (d) the possession of shipping wharves at the chief markets; (e) the control of a private railway, enabling it to give prompt despatch to its shipments.

"2. The favorable conditions of working, coupled with the fact that the Cape Breton coalfield has a practical monopoly of the St. Lawrence market, and (unless barred by future legislation) can face any competition in the New England ports, are of great value. "The collieries, under present management, should yield profitable returns, and we do not believe that any existing coal company enjoys advantages so favourable."

"3. The present collieries with the suggested extensions have a capacity for output which are estimated at 4,000,000 tons per annum.

"Another important feature is the labour question. A three years' agreement has been made between the company and its employees, having in view the improvement of mining operations and an equitable adjustment of wages, in order that the company may be in a position to enter into long-term contracts if necessary.

"On the whole, therefore, there is very good reason to hope for a speedy return on the $15,000,000 of the common stock of this company, which has received no dividend for some time past.

"The coal and iron fields of Nova Scotia, although they have hitherto been rather disappointing to the investor, are too valuable a property to remain in their present position. New markets are opening up with the growth of population in Canada, and over the vast area of lands, which, with the extension of railways, are destined for speedy settlement, the internal demands alone should be sufficient to ensure prosperity for those mines which are taking care to maintain efficiency and economic working.

A NEW TYPE FOR COAL BOATS.

The Dominion Coal Company, in furtherance of its intention to obtain a share of the Ontario market, is having a boat built in Toronto of a type which will obviate the necessity of the ocean coal boats tying to a wharf before being able to load river craft.

The type is known as a "Tubular" steamer, and will load from the larger boats in mid-stream. Belt conveyors are to be utilized for unloading and loading, and will have a capacity of 400 tons per hour. The smaller coal boats have a capacity of 2,000 to 3,000 tons, and will be able to discharge in ten hours' time; the larger boats, those having a capacity of 10,000 tons, will operate four sets of conveyors, making the unloading time no longer than for the smaller boats. It is figured that by these new boats the cost of carrying coal to Toronto will be cut to $1.10 per ton, all charges included. As the cost of American coal delivered at Toronto averages $3.35, it is figured that the margin of $2.25 will permit of successful competition with United States coal.

The new boat is to be launched about the first of June, and she will have a long enough season this year to demonstrate the possibility or otherwise of securing the Ontario soft coal market, which is figured at 2,000,000 tons per year.

PRODUCTION OF PIG IRON IN THE UNITED STATES.

The active capacity of the furnaces producing pig iron in the United States during January was 377,879 tons, or at the rate of 20,000,000 per annum. These figures are startling in the revelations they make of current consumption. In addition to the monthly output of over 1,600,000 tons, stocks are declining at the rate of 100,000 to 120,000 tons a month. The consumption is chiefly by the steel companies, whose orders for rails and structural steel are very heavy. Using this trade as a barometer, the press is uniformly optimistic about the summer of 1905.

STEEL BRIDGE SPANNING THE ST. LAWRENCE.

A steel bridge now under construction over the St. Lawrence river at Quebec is a remarkable structure. The weight of this bridge will be about 35,000 tons. Its span of 1,800 feet crosses the entire St. Lawrence river at such a height as not to interfere with navigation, and will be the longest in the world, the Forth bridge in Scotland being 1,710 feet long, the Brooklyn bridge 1,680 feet, and the new East river bridge in New York 1,600 feet. There have been manufactured by the Phoenix Bridge Company, Phoenixville, Pa., to date, and partly shipped to the site of the bridge, about 10,000 tons of steel. It will take about two more years to complete the structure. The masonry piers are entirely finished, and the temporary false works, of steel, are now in place on the south shore, upon which erection will begin at the opening of spring of this year. The 1,800 feet of steel bridge work between the piers will be erected without any false work in the river. The bridge is to be 80 feet wide over all, carrying a double-track railroad, a double-track trolley and highway, and two sidewalks. Many novel features have been adopted in the design and manufacture of this bridge. The total length of the bridge will be 3,300 feet; length of channel span, 1,800 feet; ship clear headway, 150 feet above highest tide; height of cantilever towers, 360 feet above the river. The Phoenix Bridge Company are the contractors for the superstructure.

THE WORLD'S COAL PRODUCTION.

The tenth annual general report on the coal production and consumption of the principal countries of the world has been issued by the British Board of Trade. The tables in the first part of the statement show, for a series of years, the total quantity of coal produced in each country; its value (at the collieries where possible); the average value per ton; the quantity produced per head of population; the number of persons employed in coal mining, the number employed below ground being separately shown wherever possible; the quantity produced per person employed; the quantity of coal exported; the excess of imports over exports, or vice versa; the total quantity of coal retained for consumption; the quantity of coal retained for consumption per head of population. Additional tables show, for the principal consuming countries only, the total quantities of coal consumed and the percentage proportions that are of home production, British production, and the produce of other countries. Tables are also included giving more detailed information with regard to the exports of coal from Great Britain, the United States, Germany, British India, and New South Wales, together with two short tables with regard to the consumption of coal for locomotive purposes in the United Kingdom and certain other countries, and the quantity of coal brought to London. Tables with regard to the production of lignite are given, also some particulars of the production of petroleum in the United States, Russia and other countries. The statistics are given in almost every case up to the end of the year 1902. Wherever possible figures are also given for the year 1903, but these are, to a great extent, provisional figures only, and subject to correction.

The following statement shows what has been the production of coal in the five principal coal-producing countries of the world in 1901, 1902 and 1903 :—

	Tons, 1901.	Tons, 1902.	Tons, 1903.
United Kingdom	219,047,000 a	227,095,000 a	230,334,000 a
Germany	108,539,000 b	107,474,000 b	116,638,000 c
France	31,634,000 b	29,365,000 b	34,318,000 c
Belgium	22,213,000 b	22,877,000 b	23,912,000 c
United States	261,874,000 a	269,277,000 a	320,983,000 a

a Tons of 2,240 lb. b Metric tons of 2,204 lb. c Provisional figures.

The production of coal in 1903 in each of these five countries was greater than in any previous year. The production of the United States exceeds that of Great Britain, but the production of Germany represents only about a half, and that of France and Belgium together about a quarter of the production of that country.—Coal Trade Journal.

LEAD PRODUCTION OF THE WORLD.

As contributing data which may be of value to the lead mining industry we publish the following table of the production of pig lead throughout the world during the years 1901, '02, '03. From this table it will be seen that the Canadian production, at its best, is only about one per cent. of the world's total production.

	1901. Tons.	1902. Tons.	1903. Tons.
United States	260,059	259,780	266,691
Spain	166,792	174,936	172,521
Germany	118,862	136,703	141,558
Australia	95,000	104,000	93,500
Mexico	85,000	95,000	95,000
England	35,134	25,504	30,958
Italy	25,415	25,350	22,239
France	20,690	18,522	19,500
Belgium	18,444	18,050	20,015
Greece	17,502	13,340	13,075
Austria-Hungary	12,009	13,307	13,953
Turkey	2,200	3,622	7,493
Canada	10,300	8,335	8,121
Japan	4,000	4,000	4,000
Sweden	968	826	661
Russia	400	300	400
South America	2,125	225	150
Africa and East India	100	100	165
Total	875,000	902,400	910,000

BRITISH V. AMERICAN MACHINERY.

In his recent report, Mr. Biorklund, Clerk to H.M. Legation in Mexico, remarks that the supremacy of American imports is easily understood, as, owing to the proximity of the two countries, orders can be much more easily executed, and American manufacturers are continually introducing improvements in all kinds of machinery, whether for agricultural or industrial purposes. American machinery, however, is never so serviceable as that made by the British manufacturer, for when once the latter finishes his machine it remains unchanged for many years, and repairs are always to be had, which cannot be said of those of American manufacture. In this case, when once a patent has run out, a small alteration will require a new patent, and the machine being out of date is very often rendered useless unless the purchaser orders a casting to be made of the piece which is required, at a cost which is very often exorbitant for the extent of the repair.—Foreign Office, Annual Series, 3,332.

MINING AND METALLURGICAL CONGRESS.

Members are invited to participate in an International Congress of Mining, Metallurgy, Mechanics and Applied Geology, to be held at Liége on June 26th to July 1st, 1905, in connection with the International Exhibition. The subscription to the Congress is 25 francs (£1), and members should enter their names in that section of which they wish to receive the publications. The General Secretary of the Organizing Committee is Mr. Henri Dechamps, 16 Quai de l'Université, Liége.

The autumn meeting will be held in Sheffield from September 25th to 29th, 1905. An influential committee has been formed in Sheffield for the reception of the Institute, with the Lord Mayor as chairman, and the Master Cutler as vice-chairman. The chairman of the executive committee is Colonel H. Hughes, C.M.G.; the vice-chairman, Mr. J. Rossiter Hoyle; the hon treasurer, Mr. Francis Huntsman; and the secretaries, Professor J. O. Arnold, Mr. A. McWilliam, and Mr. J. Wortley.

McGILL UNIVERSITY SUMMER SCHOOL.

The Field Class in Mining of McGill University is just completing its annual session. The party, numbering about eighteen, started out a little over a month ago, in a private car furnished by the Grand Trunk Railway, and visited first the magnetite mines, at Mineville, N.Y., the blast furnace at Port Henry, N.Y. (2 days); the anthracite mines and breakers of the Wilkesbarre and Scranton regions of Pennsylvania (3 weeks); the anthracite open cut workings at Hazleton, Pa. (2 days); the Sleetington and Bangor slate quarries of Pennsylvania (one day); the Bethlehem Steel Works (2 days); the Crucible Steel Works of America, Newark Works (one day); the American Smelting and Refining Company, lead smlters and copper refinery; Perth Amboy Works (one day); the Nichols Chemical Company, copper smelters and refinery, Laurel Hill Works (one day); New York subway and extension and Hudson River tunnels (one day); and Columbia University (one day).

As will be seen, the main part of the work was done in the anthracite region, where the party spent nearly two weeks in daily underground work in the mines of the Susquehanna Coal Co. (Penn. R.R.). Visits were also made to specially interesting operations of the Lehigh Valley Coal Co. (road haulage and coal proportion) and the D. L. & W. Ry. Coal Co. (electric equipment). Several days were also given to geological field work in the neighborhood of Pittston and Hazleton. Following this more detail work, a number of brief visits were made to mines and metallurgical establishments, and, finally, to a few of the most interesting of the recent engineering developments in New York City. The party is in charge of Dr. Porter, Professor of Mining, assisted by Mr. J. F. Robertson, Lecturer in Mining, and for the geological part of the work, by Dr. A. G. Wilson.

THE CANADIAN MINING REVIEW IN THE MARITIME PROVINCES.

Mr. E. Geoffrey Stairs, formerly employed in the head office of the Canadian Mining Review, has been appointed representative of The Review Publishing Co., in the Maritime Provinces, where he is well and favorably known.

MINING MEN AND AFFAIRS.

Mr. David Brown, formerly of the Oxford Copper Co., Constable Hook, New Jersey, has been appointed Metallurgist to the Canadian Copper Company, with headquarters at Copper Cliff.

The death occurred in Toronto, on May 3rd, of Mr. George Gooderham, for several years past prominently associated with mining in the West. He left an estate valued at $15,300,000, his mining interests being valued at $1,000,000.

It is reported from Ottawa that there is no immediate intention of filling the vacancy caused by the resignation of Mr. Congdon as Commissioner of the Yukon. The duties of the office are meanwhile being performed by Major Woods, as Acting Commissioner.

We are glad to learn from a recent letter that Mr. Geo. I. Waterlow, who last month underwent, at Calgary on his way to Rossland, a critical operation for appendicitis is making rapid recovery, and hopes soon to be able to conclude the negotiations of the proposed Le Roi-War Eagle-Centre Star amalgamation.

An Order-in-Council has been passed creating the Temiscaming Mining District of Ontario, covering the areas of the rich silver cobalt deposits discovered on the Temiscaming Railway, and a considerable district to the north. The head office of the district will be at Haileybury, and will be in charge of Mr. Gea. T. Smith, of Mattawa.

Mr. T. F. Kenny has been appointed Mechanical Engineer of the Allis-Chalmers-Bullock, Limited. He graduated from the Department of Mechanical Engineering at McGill University, in 1896, and then spent two years with the British Columbia Iron Works. For the past six years he was Mechanical Engineer for the Jenckes Machine Co.

The Vancouver Island Exploration and Development Syndicate, which controls the Victoria Mine, near Ladysmith, B. C., has elected the following directors: Messrs E. Dewdney, H. Cecil (manager), W. A. Stevens, J. L. Beckwith, Sam Erb, W. T. Williams, and R. T. Elliott. Mr. J. L. Beckwith was appointed president; Mr. A. Lindsay, auditor.

At a recent meeting, Mr. Warner Miller, of New York, and ex-senator of New York, was elected president of the Montreal & Boston Company, which is about to undergo reconstruction. It is understood that the financial affairs of the company will now be placed on a satisfactory basis, and an adequate sum of money will be provided for the continuation of development work and equipment of the properties.

A meeting of the Institute of Science was held during the month at Halifax to hear read a paper presented by Mr. M. V. Grandin, of Chetecamp, on the ore deposits of that district, which have attracted considerable attention lately. A paper was also read by Mr. F. H. McLearn, of the Dalhousie School of Mining and Metallurgy, giving the results of a detailed structural analysis of the Golderville anticline of the gold measures of Nova Scotia.

Mr. Ross Thompson, well known as one of the pioneers of Rossland, who like many others in those happy-go-lucky-days made money and let it slip through his fingers again, recently went to the new gold fields of Nevada, where, report has it, his old luck has followed him, for he and his prospecting parties are said to have located this spring some exceedingly promising gold-copper showings, distant about thirty-five miles from Goldfields.

Assuming, no doubt, that the Rossland Miners' Union had already received a salutary lesson, as an outcome of the litigation consequent upon the strike of 1901, and, generously enough, not desiring to "rub it in," if the colloquilliner be permitted, the War Eagle-Centre Star companies have withdrawn the judgments obtained against the Western Federation of Miners, and the local Union, in consideration of the merely nominal payment of the sum of a thousand dollars.

Mr. George S. Waterlow, of London, a director of the Le Roi Mining Co.; W. H. Aldridge, of Trail, manager of the C.P.R.'s mining department; James Cronin, Rossland, general manager of the Centre Star and War Eagle Company; and A. T. McMillan, Rossland, manager of the Le Roi Mining Companies, with Mr. T. G. Blackstock, of Toronto, have been in Montreal in consultation with Sir Thomas Shaughnessy concerning the amalgamation of the Trail Smelter with the proposed combination of Rossland mines.

Although the Dominion Government has decided not to send an exhibition of minerals to the Lewis and Clark Exposition, which will be shortly opened at Portland, Ore., a good display of Canadian ores and minerals from the west, will, it is hoped, be made. It is possible that some action in the matter, so far as British Columbia is concerned, will be made by the Provincial Mining Association, while already in the Yukon steps are being taken to get together a representative collection of minerals, chiefly in the form of gold dust and nuggets.

In a speech recently, in the Ontario Legislature, Mr. R. R. Gamey, referring to the zinc resources of the province, said that too little was known about them at the present time, although the value of the mineral was very great. Missouri, he stated, was treating zinc ores of 15 per cent., while ores of 20 and 25 per cent. were neglected. He also stated that there was no smelting plant in the province, and when an attempt was made to ship zinc ore to Belgium last year, the Government export duty of $5 per ton prevented a development of the industry.

Mr. R. W. Brock, we learn, has estimated the cost of re-surveying geologically the Rossland district at the high figure of $8,000.00, which estimate does not include the salaries of himself or of his two assistants. He furthermore asks for the services of two assayers, two surveyors, two draftsmen, one metallurgist, and one lithologist, who are not connected with the survey force. It is understood, however, that the Director has not yet sanctioned the work, and that Messrs. Brock and Boyd have instead received instructions to proceed to the Lardeau district to continue the work begun last year in that section.

A party of officials of the British Columbia Copper Company, composed of Messrs. Underwood (president), Thomas (consulting engineer), Schon and Merrill, visited the Similkameen district of British Columbia during the month, with a view, it is said, to ascertaining the probable ore-tonnage that the mines of that district might be expected to afford to a smelter which the company have some idea of establishing at Midway. With the exception of the Nickel Plate mine, at Hedley, there are no properties in the Similkameen which have been developed much beyond the prospect stage, though the potentialities of the district are extremely promising.

A table compiled by the American Iron and Steel Association shows that the production of pig iron in Canada became of importance in 1901, and amounted to 244,999 tons. For 1902 it was 319,000 tons, for 1903 265,000 tons, and for 1904 it totalled 270,000 tons. The output is now being stimulated by Government bounties, and it is probable that a demand for rails in the making of new and great railways will help in bringing the 1905 production up to the standard of 1902. The annual report of one of the chief producing companies shows a profit of $500,000 for 1904, as compared with $855,000 in 1903. The decrease was due chiefly to the lower prices which were obtained, but there was also some reduction in the quantities of the ore mined.

We have much pleasure in congratulating Mr. L. H. Cole, of McGill University, Montreal, on having been awarded first place, by the judges, for his excellent paper, entitled "Mine Surveying Methods Used in the Centre Star Mine, Rossland," sent in for the Student Papers Competition, and read at the last annual meeting of the Canadian Mining Institute. Mr. Cole's paper was not only very carefully prepared, well written and illustrated, but also showed considerable originality in treatment of the subject. The other papers, in order of merit were, a paper by Mr. A. McL. Hamilton, also of McGill University, entitled "Notes on Recent Reverbatory Smelting Practice at Anaconda, Montana;" and a paper by Mr. G. C. Hanes, School of Practical Science, Toronto, on the "Solubility of Cobalt and Nickel Arsenides in Ammonia."

Mr. Ned Wallingford, the manager of the well-known Wallingford Mica Company, met with a serious accident, in the middle of last month, in Ottawa. After getting off an electric car on Sussex Street he crossed the track and was struck on the head and knocked senseless by another car coming in the opposite direction. He was at once carried to the Protestant Hospital, where he lay unconscious for several days. We are glad to learn, however, that he is now out of danger, and he is so much improved that he will soon be able to resume his duties as manager of the concern whose success is in no small measure due to his untiring energy and hard work. Mr. Wallingford is the discoverer of the famous Wallingford mine, of the Battle Lake and Rheaume Lake mines, and of several other prominent mica properties in the district of Perkins Mills in the County of Ottawa. The accident at this time of the year is the more to be regretted, as the better outlook in the mica market just now prompted operations in these mines on a much larger scale than heretofore; but we trust that Mr. Wallingford will take up his duties ere long at the head of the successful concern with which he is connected.

CANADIAN MINING NOTES.

NOVA SCOTIA.

The steamer Micmac was loaded with 2,200 tons of pig iron from the Nova Scotia Steel & Coal Co.'s pier, North Sydney, for Montreal. The coal seam at Broad Cove still maintains its dip towards the north, which inclines to the presumption that there is yet a big lot of coal to the northward.

QUEBEC.

It is reliably stated that neither the trainmen nor the machinists in the employ of the Dominion Steel Company have made any formal demand for an increase in wages. It is generally thought, however, that the demand will be made ere long by the skilled workmen, to obtain a raise in wages, which they feel satisfied of securing, owing to the present great demand for skilled labor.

The company has now more orders for its products than it can fill, and to ensure the required output the service of skilled workmen must be retained.

NEW BRUNSWICK.

The British Columbia Review, of London, states that an English syndicate has secured control of the New Brunswick oilfields, and development work on a large scale is looked for as a result of the deal just consummated. Under the arrangements all shareholders of the original company become shareholders with the English syndicate, receiving two shares at the par value of £1 each for each share they owned. The new company will have a capital of £650,000, and besides giving the two shares to each shareholder of the New Brunswick company, it will put in the treasury £100,000 in cash for immediate development work, and £100,000 in stock for future work. The great drawback in the past has been the lack of sufficient capital to enable the company to prosecute development work successfully. All this should now be changed, and if the oilfields are as extensive and as productive as the preliminary work seems to indicate, the future will be encouraging. As the controlling interest in the company will be held in England, the head office will be there, but it is understood that arrangements will be made which will keep a fair share of the influence in Canadian hands.

ONTARIO.

It is reported that the Bruce Copper Mines are to be re-opened by an English syndicate. The representative, Mr. E. O. Williams, an English engineer, has been recently at the mines examining the properties.

It is stated on good authority that the United States Steel Corporation is looking for a site in Ontario for the establishment of a Canadian steel plant. Mr. Gayley, first vice-president of that company, paid a visit to Port Colborne, Ont., last week, and looked over the advantages of that place. It has admirable vessel facilities, both for the shipment lake and canal, and with a few miles of railroad construction could have rail outlet via the Grand Trunk, Canadian Pacific, Pere Marquette and Wabash Railways.

It is understood that a new steel and iron works will be established at Morrisburg, Ontario, by an American syndicate headed by William J. Allison, of New York City. Morrisburg is situated on the Canadian side of the St. Lawrence River, just east of Ogdensburg, New York.

ALBERTA.

The Canadian Metals Co., who are erecting the zinc smelter at Frank, have purchased the big steel stack, 105 feet high, formerly used by the Republic Power & Cyanide Co., of Republic, Wash. This stack weighs ten tons, and will require three flat cars to transport it. Besides the stack, they have also purchased from this company about three carloads of machinery, including two sets of 26 inch steel, an H crusher and a number of mine and mill cars.

Rapid progress is being made on the smelter plant, the pottery group building being more than half up, and the foundation for the main building is completed and the walls are being run up by the masons.

BRITISH COLUMBIA.

The Coast.—The Britannia Copper Syndicate expects to be sending ore from the mines of the company to the smelter at the rate of from 250 to 500 tons per day by July 1. It is expected about 1,000 men will be employed in and about the mines. Meanwhile the syndicate has purchased the Crofton Smelter, at Crofton, V.I.

While the Britannia Company and the new smelter company will remain distinct concerns, the arrangements entered into for the smelting of Britannia ore at Crofton will be continued. The smelter, will, however, remain a custom smelter, and will handle ore from all shippers.

Nicola.—The Portland Mining Co., of Terre Haut, Ind., have recently acquired 880 acres of land and water rights for 1,000 inches of water, and contemplate installing a power plant to be used in connection with the working of the property, which is to be extensively developed this summer.

Atlin.—Tar Flats, on Pine Creek, above Discovery, have been the locus of winter sinking and mining operations. Sluicing is now under way on the creek, and reports are to the effect that the yields will be good. The two largest dumps are those owned by Helgren & Co., and Van Volkenberg & Sons.

The Pine Creek Power Co.'s ditch, as well as the Brackett ditch, are running full.

The Willow Creek Mining Co. have ordered an additional 1,400 feet of 28-inch pipe in order to increase the scale of their workings.

Operations on Birch Creek have been resumed, and on pay dirt this time; a very large clean-up is expected.

Cariboo.—The matter of the Slough Creek, Ltd., was recently in the British courts, when counsel said the company and its liquidator asked the Court to sanction a scheme by which the debenture-holders were to receive fully-paid shares in exchange for their debentures. The company was formed in April, 1903, with a capital of £200,000, to work certain mining rights in British Columbia, and it took over the business of a previous Slough Creek Company. An agreement had been entered into between the company, its liquidator, and the Federal Property and Assets Trust, Limited, providing for the sale of the assets to the Federal Company for £75,000, to be satisfied by the issue to the debenture-holders of 150,000 fully-paid shares of 4s. each, so that they would get £30,000 worth of shares in exchange for £19,600 debentures. The shareholders had agreed to the sale as a going concern. The Court sanctioned the scheme of arrangement.

Lardeau.—A considerable activity is reported in the Ainsworth district. Development is being resumed on the Smar and Sunset, where a long tunnel is to be run. The lease-holders of the No. 1 have been most fortunate in the working of that property, having struck a rich vein of carbonates from which already two carloads have been shipped.

The Bonanza group has been recently bonded in this district, and work is to be commenced forthwith. The property is situated on Haskin Creek, about three miles southeast of the Silver Cup.

The Eva Gold Mines, Limited, of Camborne, Lardeau district, has applied to the Gold Commissioner for financial aid to build a new trail from Camborne to the mine. The present trail is steep, and is in bad condition.

The Spokane Falls people who are mining near Camborne are making daily clean-ups of good dimensions. For one day, one man cleaned up 42 dwts., and the days average about 25 dwts. to the man.

Slocan.—Ore has at length been struck in the lowest tunnel of the Reco. The value of the discovery is not yet known, but the work of drifting to discover this ore body has been in progress for a number of months past. The Reco last month paid a further dividend of $20.00.

A splendid body of ore, six feet wide, has been uncovered on the Hidden Treasure, one of the four claims owned by the Republic Mines, Limited. The lead is very clearly defined, and the formation distinctly traceable for over a mile through three of the company's claims. The assays give values in gold, silver and copper. The properties are between Greenwood and Boundary Falls, on the west side of the railway. W. T. Smith, the original discoverer of the Knob Hill and the Ironsides, at Phoenix, is manager.

The lessees of the Majestic and Unexpected are now being rewarded for their persistent entrprise, as they have struck two feet of ore, says the Sandon "Standard." For over eighteen months the lessees have been working the property, and recently secured two years' renewal and an option of a bond. A few cars of the ore were shipped last year, but the main shoot ore was not exposed.

Mr. S. S. Fowler, of Nelson, has leased the Whitewater Mine in the Slocan. The old lessees have been shipping at the rate of two to three cars a week.

The mill of the Minnesota Silver Company, at Sandon, is turning out a high grade zinc product. A recent carload of 33 tons, sent to Pueblo, Colorado, gave zinc 50.5 per cent., lead 1 per cent., silver 31.5 ozs. to the ton.

Mr. G. O. Buchanan, B. C., Administrator under the Lead Bounty Act, is attributed with the statement that when the Marysville smelter is in operation the production of metallic lead will be increased to about 24,000 tons per annum. The lead production of the Canadian Smelting Works, Trail, is placed at 8,000 tons per annum, and that of the Hall Mining & Smelting Co.'s smelter, at Nelson, at between 8,000 and 9,000. The Sullivan Co.'s works, at Marysville, East Kootenay, will, it is thought, produce between 7,000 and 8,000 tons.

The new plant installed during recent months at Kalso for the treatment of zinc ore is now in operation. The building is 80 by 75 feet. The ore is received in bins below the level of the tracks, from which it is fed by an automatic feeder to the roasting furnace, which is of the White-Howell revolving make, with a capacity of 60 tons per 24 hours and upwards, according to the amount of roasting required, an advantage of this make of furnace being that the degree of roast which is found to give the best results with the different classes of ore is cooled by passing through an iron revolving chamber, where it is rotated through currents of cooled air, and thence, after a preliminary sizing and recrushing of the over size, the ore is elevated to the top of the building, where it is subjected to a very close and accurate classification, eight bins being provided (with ample accommodation for more if necessary), to contain the various degrees of fineness, each accurately sized. The ore is now ready to be delivered by an automatic feeder to the process of magnetic separation, whence the finished product proceeds directly to the shipping bins.

It is anticipated that the mines at Slocan will be greatly benefited by the installation of this plant, as facilities are thereby afforded, heretofore lacking, for the local handling and marketing of zinc ores.

Nelson.—American capitalists, it is stated, have become interested in the development of the La France mine in this district, and money has been provided for the development of the property during the ensuing summer.

The Athabasca-Venus, Limited, owning mining properties on Toad Mountain, near Nelson, is in liquidation, with J. J. Campbell as receiver.

Mr. J. N. Scott, of Everett, Wash., has purchased the Dundee group of claims, near Nelson, for a party of Everett capitalists. The group consists of three claims, the Dundee, Dundee Fraction and M. S. Fraction adjoining the Poorman, and Gold Note on Forty-Nine Creek.

The lead receipts from the Halls Mines smelter for April totalled 3,883,864 lbs., or about 1,942 tons; the lead contents amounted to 1,784,985 lbs., averaging nearly 50 per cent lead. The St. Eugene mine sent 1128 tons of ore, and the Ymir was second with 175 tons.

Boundary.—The Granby Co. has further extended its properties in the Boundary district by having recently acquired the Bank of England claim, a copper-gold property in Phoenix Camp.

Shipments have recommenced from the Winnipeg mine, upon which work was recently resumed. The ore is being shipped to the Granby smelter, the company having a bond on the property. It is some eighteen months since the ore was sent out from this property.

A new tunnel is being driven on the Helen, a high grade gold-silver property, near Greenwood, and it is stated a new well-mineralized lead has been encountered, said to be four feet wide. The Helen was acquired by Chicago capitalists at the beginning of April last.

At a general meeting of the shareholders of the McKinley Mines Company, owning the McKinley and Hanna mineral claims, Franklin camp, held at Grand Forks, on Tuesday, a working bond for $150,000 was granted Miles H. O'Brien, jun., of New York, as trustee for Boston and New York capitalists. The life of the bond covers a period of eighteen months from April 1st. The McKinley has a large surface showing of ore.

Twenty other claims in the same camp, water rights and a townsite of 320 acres have been transferred by Mr. McLeod to the eastern syndicate. The deal is fraught with great possibilities for Grand Forks, as it is likely to result in the opening up of the rich mineral resources of the north fork of the Kettle River.

The output of the Boundary Creek division for April was 80,102 tons, or about 10,000 tons less than for March. The decreased output is attributed to the fact that so many smelter stacks were under repair in April.

East Kootenay.—Experiments are being carried on in Denver, Colo., with a view of ascertaining whether the installation of a lixiviating plant will solve the problem of the Paradise ore, near Windermere, in the event of the Kootenay Central Railroad not being built this season, which seems more than likely. The mine to date has shipped about 1,000 tons of ore, averaging about 50 ounces in silver and 60 per cent. lead, or, roughly, a $45 ore. This was to meet development expenses. The property is situated fourteen miles up Toby Creek. The Paradise is not shipping any of its second class, which runs about $18 to the ton. A recent examination by S. S. Fowler put a guess of the amount of ore in sight at 25,000 tons, but as the lead is very irregular, being in a contact zone rather than vein, Mr. Fowler does not pretend that his estimate is any more than an approximation. About a mile of development work has been done, one tunnel on the fourth level being 1,500 feet, with a depth of 525 feet from the outcrop. Development is being continued, the fourth level being pushed, and as soon as the ore body is reached the various levels in the mine will be connected by upraises. —Wilmer Outcrop.

The East Kootenay town of Cranbrook, now a divisional point on the Crow's Nest Pass line of the C. P. R., is to become incorporated.

The Fort Steele Prospector states that there is a rumor to the effect that the Mackenzie-Mann mines on Hucklebury Hill will be consolidated and a company formed to operate the property.

COAL MINING NOTES.

NOVA SCOTIA.

It is estimated that the reorganization of the Dominion Coal Company will place the finances of that company on a sound and satisfactory condition, as it eliminates its heavy floating debt, large indebtedness to the Dominion Iron & Steel Co., and the heavy annual payments for interest and preferred stock dividends.

A strong syndicate of banking interests in Boston, Montreal and Toronto has purchased from the Dominion Coal Co. the entire issue of $3,000,000 new seven per cent. preferred stock and $5,000,000 of five per cent. bonds, which will prove sufficient capital to redeem the present issue of preferred stocks and bonds, pay off all the indebtedness of the company, and leave a comfortable surplus for working capital, taking into consideration, of course, sinking funds and cash on hand

Fixed charges of the company for 1904 amounted to $730,137. They are estimated for the present year at $655,000, while under the new plan they will be in the first five years $460,000 per annum, thereby effecting a saving of $270,000 over last year's charges and $195,000 less than this year.

The reduction in fixed charges is shown by the folowing table:—

	As now out.	Chgs. & div.	As reorganized.	Chgs & div.
Bonds	$2,435,000—6 %	$146,100	$5,000,000—5 %	$250,000
Stock	3,000,000—8 %	240,000	3,000,000—7 %	210,000
Debt	2,380,000—5 %	119,000	....	.....
Sink. fd...	....	150,000	....	None for 5 yrs.
Total..	7,815,000	655,000	8,000,000	460,000

The average net earnings of the company for the past three years have been between $1,600,000 and $1,700,000 per annum.

The Cape Breton Coal, Iron and Railway Company have awarded contracts aggregating $30,000 for the erection of buildings at their collieries at Broughton, Cape Breton. The buildings include a hotel, private residence, and general offices. The company will spend $250,000 there this summer.

George McKenzie, a prospector, claims to have discovered a vast coal area in Northern British Columbia, near the proposed line of the Grand Trunk Pacific

The April output and shipments of the Dominion Coal Company were as follows:—

Dominion No. 1	44,578 tons
Dominion No. 2	41,371
Dominion No. 3	.....
Dominion No. 4	39,187
Dominion No. 5	50,263
Dominion No. 7	5,865
Dominion No. 8	16,845
Dominion No. 9	23,432
Total	221,541 tons
Shipments	139,226

The April shipments of coal by the Cumberland Railway and Coal Company amounted to 37,890 tons.

Coal Export.—It is reported that the Dominion Coal Company having succeeded in creating a small market for Cape Breton Coal in Mexico, have sent a trial shipment of 3,000 tons to South Africa. If the experiment is successful, the company will be able to maintain operations on a continuous scale throughout the winter seasons.

This company expects to ship about 2,100,000 tons of coal this season, or about three or four hundred thousand more than last year. Of this, a small amount has been contracted for to be delivered in Toronto and other Ontario points.

The Dominion Coal Company are making arrangements for the erection of a discharging plant at Halifax. This is evidence that the company anticipates extending its business at this point, as a tower costs all the way from twenty to forty thousand dollars. The company have secured a wharf property adjoining the Tram Co.'s power house.

A coal trade between Cape Breton and Sweden is now to be resumed, the Dominion Coal Company having arranged to market coal in Sweden, and bring back iron ore, which will be sold to the Dominion Iron & Steel Co.

The Acadia Coal Company loaded its first steamer for the Montreal market the first week in May. This first shipment is to be rapidly followed by others.

Of the first cargo from the Acadia Coal Co., some 1,100 tons came from the Acadia colliery, and the balance from the Albion colliery. The deficit in the Acadia output was due to the strike.

The Nova Scotia Steel & Coal Co.'s regular fleet for the season consists of eleven steamers, including the two owned by the company. Eight of the steamers will be employed as coal carriers, and three in the ore trade. The capacity of the coal carriers is from 2,000 to 4,500 tons. One of the ore steamers is very large, with a carrying capacity of 7,400 tons. The smallest of them carries 4,000 tons. This company has everything in splendid condition for rapid handling of its products, and this should be one of the best years in its history.

ONTARIO.

The annual convention of the Western Ontario Coal Dealers' Association was held at London, Ont., last month. The principal question discussed was that of abuses in connection with transportation, more especially the inequality in freight rates. It was urged that the western portion of the province was unjustly dealt with, rates upon coal coming by rail via Detroit being so much higher than on consignments by way of Suspension Bridge. Resolutions on the subject were adopted for presentation to the Dominion Railway Commission and the Ontario Legislature. The following officers were elected: President, John C. Hay, Listowel; vice-president, Wm. Heaman, London; executive committee, F. Mann, Brantford; John Garroch, Sarnia; A. J. McIntosh, Woodstock; J. K. McLauchlin, Owen Sound; and F. M. Griffin, St. Thomas.

E. F. Stephenson, Inspector of Crown Timber and Mines, has returned to Winnipeg from an official trip through the West, and reports a rapid development of the coal-mining industry in Alberta and southeastern British Columbia, especially in the Crow's Nest Pass and at Banff. Mines are also being worked on the Knee Hill Creek to the northeast of Calgary, the product there being a good quality of coal resembling the English Cannel coal, between a high-grade lignite and anthracite. It burns well in stoves and furnaces, and can be bought by settlers at $1.50 per ton at the mines, and much of it is also disposed of in Calgary.

The Dominion Iron & Steel Co. have officially notified the Dominion Coal Company of their intention to operate three blast furnaces as soon as the coke ovens are completed, in order to insure, as per the agreement between the two companies, an adequate supply of coal.

BRITISH COLUMBIA.

The Seattle and Washington Coal Company has been formed in Seattle during the past month to acquire and develop about four square miles of coal lands near Coutlee, in the Nicola Valley. This property has been held under lease for some years back, but seemingly has not been opened up to any extent. There are, however, many promising indications of coal in this vicinity.

Very considerable credit is accorded the engineering department of the Coal Creek Mines for the expeditious manner in which mining operations were continued after the destruction of the tipple by fire in March last. Timbers were being set for No. 1 tipple while the ground was still hot, and water used to cool it. Inside of three days coal was dumped down the chute. A temporary screen was placed on this tipple, and the coal cleaned as effectively as before, but with more cost to the company.

The regular battery of 390 coke ovens at Fernie have continued without any interruption, as if nothing had happened. A lot of surplus slack has been used, and now the supply is regular again.

The engineering department worked night and day on plans for the new tipple. The trestle alone, if built of wood, will cost in the neighborhood of $2,000, and if built of steel the cost will be more than double that amount. The tipples and all machinery to be replaced will make the total expenditure exceed $200,000.

The new structure will be modern in every particular, and will have a capacity of more than double that of the old one. It may have capacity to load box-cars and open-top cars on two tracks each and slack cars on another track, and one or perhaps two box-car loaders will be employed. The new plans for the track, etc., may necessitate the removal of all colliery buildings from their present position, and also some alterations in the course of the creek. These alterations will cost $50,000. It is estimated that the permanent tipple will be completed in about four months.

The contract for the new tipple at the Coal Creek colliery has been let to the firm of Heyl and Patterson, of Pittsburg. The tipple will be built entirely of steel, and will be in every respect a most modern equipment. The following description appears in a recent issue of the Fernie Free Press:—

"The entire structure, stretching across the valley, 900 feet in length, will be built of steel. Its position will be a few feet farther up than the site of the wooden structure that was destroyed by fire on March 11th. Starting at the mouth of No. 2, the trestle runs in a straight line to the opposite side of the valley.

"The tipple proper is 234 feet long, and forty-four feet wide, with extensions for picking tables. The width of the trestle is thirty feet. The entire structure is to be roofed with corrugated iron sheeting, and the tipple will be housed in with metal siding with windows for lighting. All the supports are to be built on concrete piers sunk deep in the ground.

"The new tipple will be equipped with the latest machinery for dumping, cleaning and loading the coal. Two revolving dumps, with a daily capacity of 4,000 tons, will empty the coal cars as they enter the tipple. These dumps turn the cars upside down and do away with the need for doors on the end of the cars. Each of these dumps is connected with a distinct system of machinery for treating the coal, which is briefly described as follows: The coal after entering the receiving hopper is fed to the shaking screens, which delivers the coal to the picking table. A hinged apron at the end of the table is lowered into the railroad car, and the coal is loaded without any drop. Alongside the picking table is a revolving rock conveyor. As the rock is picked off the table it is placed on the rock conveyor which takes it to the rock bin, where it is loaded on a car. Underneath the shaking screens is a belt conveyor which carries the slack and fine coal to the slack car beneath. This system, as stated, is duplicated for the other car dumper. Each picking table is five feet wide and fifty feet long, and extends at right angles to the tipple. Each small car after being dumped is pushed along a return track by a 'trip maker,' and loads of empties are automatically made up.

"Two of the celebrated Smith Gravity Box-car Loaders will be installed. These will be similar to the ones installed at Carbonado a couple of years ago, which have given great satisfaction. The car is tipped on one end and then on the other, and each end is loaded by gravity. All the machinery of the tipple is worked by electricity, supplied from the power house. Coal can be loaded on to four tracks and slack on to one track. The tipple's capacity will be 4,000 tons daily.

"The structure will contain 850 tons of steel. The parts will be made at the factory at Pittsburg, and shipped here ready to be put up. The contracting firm agrees to have the tipple ready by July 18th to ship 2,000 tons daily. The total cost of the entire structure, with machinery, will approach close to $200,000. Heyl and Patterson are large contractors who do a great amount of work of this kind, which fact may easily be deduced from their agreement to have the tipple well on to completion in three months."

ALBERTA.

It is satisfactory to note that the Canadian-American Coal and Coke Company are now again in full operation, the fire, which started some time ago in one of the rooms, having now been got under control.

The assets of the North-West Coal and Coke Company have been acquired by an English syndicate, which will return the original shareholders a satisfactory profit on their investments.

The new tipple at the No. 1 mine of the Lillie Collieries has been put in use and the force of miners employed at the mine increased. This company is now making a larger output of coke than formerly, and is marketing their product with the British Columbia smelters. Meanwhile, the company has entered into a contract with the United Mine Workers, ensuring stability of labor conditions for a period of two years.

The International Coal Company, of Coleman, is at present working one shift, and shipping about 600 tons daily. This is the largest output now being made by any collieries in the district.

A washer is shortly to be erected at these collieries.

Tenders are being invited for the sinking of a main hoisting shaft at Breckenridge and Lund Coal Company's Collieries.

MINING COMPANY MEETINGS.

The Britannia Mining Syndicate.—The annual meeting of the Britannia Mining Syndicate was held in Vancouver last month, the Hon. E. Dewdney, presiding. The chairman stated that since the last meeting the work had been carried on with great energy. The financial statement for the past year showed that the capital stock of the company is divided into 400 shares at $625 each fully paid, amounting to $250,000. The mineral property, plant, buildings, and water power, are valued at $212,104.13. There is shown on the accounts an unexpected balance of advances in the New York office of $51,042.74, and cash in the Bank of Montreal $14,102.84.

"The work on the construction of the buildings and tramway did not commence before August of this season. Previous to that about forty acres of densely wooded flat had been cleared at the beach, where are erected the several buildings in which the machinery is being installed.

"On the shore, in the most protected part of the harbor, a substantial wharf, with approach of about 250 feet in length, with frontage of 100 feet, has been erected, with a tramway leading from it to the centre of the flat for the purpose of handling the heavy machinery to be installed in the different buildings. A building, 133 by 125, has been completed, capable of accommodating about sixty concentrating tables, all of which are now being placed in position. A crushing mill, built on the brow of the hill, is now verging on completion. The power-house is practically completed, and awaits the installation of the machinery which has been provided for.

"The aerial tramway being built by Mr. Riblet is far advanced towards completion, the lower section, about two miles in length, being finished as nearly as it is possible, until such time as material has all been transported for the upper section. The upper section, of about one mile in length, is expected to be completed in about five weeks.

"A dam of very substantial proportions has been constructed on the creek, from which point water will be taken to operate one of the most powerful water powers on the coast. The piping and all the material necessary for its completion are on hand, and only await the taking over of the tram line from the contractor, to be placed in position.

"Work at the mine has been simultaneously carried on, and consists of various buildings for the accommodation of men at that point, a crushing mill, ore bins at Jane and Bluff tunnels, ore bin at upper terminal of tramway, trestles leading from the tunnels to upper terminal and necessary snowsheds, are about completed, together with work being done for tramming the ore to the surface.

"It is confidently expected that the month of May, at the latest, will see the whole of the machinery in perfect order, and ready to handle the ore up to its fullest capacity."

Slough Creek Gravel Gold.—The first annual meeting of the above company was held in London, England, last month, Sir J. Bevan Edwards, chairman of the company, presiding. The chairman, in the course of his address, said that Mr. J. D. Kendall, consulting mining engineer, went to the Cariboo to report upon our properties on behalf of a group of gentlemen interested in mining, with the object of acquiring the property from the old company if Mr. Kendall's report was satisfactory. As this proved to be the case—and we must all acknowledge that the report was highly satisfactory—a new company was registered for the purpose of acquiring the property, and the terms offered to the old shareholders were unanimously agreed to. On the formation of the new company Mr. Kendall was appointed consulting engineer, and the work at the mine is now being carried out energetically under his directions. He estimates the value of the gravel as at least £1 to the yard cube, but he feels very sanguine that it will be higher, and that with an output of 200 cubic yards a day, the gravel can be worked for 10s. a yard, including all expenses. There will be no difficulty in maintaining this output from the present shaft alone, when the gravel is opened up, and Mr. Kendall considers that by sinking two or three more shafts, and thereby drying a large extent of channel, the output of 200 yards a day can be increased to any extent suggested by economical considerations. Even if the estimate of the value of the gravel made by Mr. Kendall is not exceeded, the company have a most valuable property, but the gravel so far met with in opening up the channel in Slough Creek has nowhere been less than £3 to the yard cube—more than three times as rich as Mr. Kendall's estimate. The Slough Creek shaft—which is the only shaft put down as yet in the company's property—is on the old channel of William Creek, eight miles below the part which yielded gold at the rate of £2,000,000 to the mile. In these eight miles the old channel receives numerous feeders from leads which have produced large quantities of gold from their upper parts. The work already done from the shaft in Slough Creek gives every indication that the gravel in the channel at that point will equal in richness, even if it does not exceed, that of the upper part of William Creek.

The company's property extends to 13 miles of old channel or deep lead, 11 of which is the old channel of William Creek. It must not be forgotten that this channel is in the very centre of the gold belt, that there are no engineering difficulties in opening up the gravel which cannot easily be overcome.

Mr. Kendall, who addressed the meeting, observed that the indications were that the ground would be rich, and he did not think it would be long before they would be able to demonstrate this on a commercial scale. There was no apparent reason why it should not be as rich as it was in either Lightning Creek or Williams Creek. However, time alone could settle that. The present prospects were excellent.

COMPANY NOTES.

Montreal & Boston.—This company is being reorganized in a very radical manner. It is proposed to issue $700,000 first mortgage 6 per cent. bonds, which are underwritten at 80, and to change the par value of the stock from $5 to $1, giving the present stockholders one share of the new stock, par $1, for every share of old stock, par $5.

The capitalization of the new company will compare with the old as follows:—

	Present capitalization.	New capitalization.
Bonds, 6 per cent.....	.....	$ 700,000
Stock	1,300,000	2,600,000
Par value shares.....	$5	$1

Of the above 2,600,000 shares, 1,000,000 go to the old shareholders, 1,400,000 as a bonus with the $700,000 bonds on the basis of 200 shares of

stock with every $1,000 of bonds, and 200,000 for reorganization expenses and as a bonus to Munroe & Munroe creditors.

As the creditors of Munroe & Munroe have 310,000 shares of stock, they get as stockholders 1½ shares of new stock for each share of old.

Mackenzie & Mann, the original owners of the Dominion group, have underwritten $300,000 of the new bonds, and they will be represented on the board of directors of the new company.

The proceeds of the bonds will be used to pay all indebtedness due on the Dominion group of mines and on the other properties, all floating debt, and leave a balance of $250,000.

Immediate steps will be taken to enlarge the smelter from two to four furnaces.

Dominion Coal.—At a general meeting of shareholders of the Dominion Coal Company, to ratify the plan of financial reorganization, President James Ross said, as the company would not have any sinking fund to provide for five years, the saving to be effected annually would be close on $200,000, keeping in view also the difference in interest on bonds and preferred stock. Besides that, the company would now have no floating debt, and there would be $2,000,000 in the treasury to carry out improvements. Mr. Ross said thirty-five per cent. of the issue of new securities had been underwriten by the directors, and the remainder by Bank of Montreal, Bank of Commerce and American banks. He was unable, in answer to an enquiry, to state the price at which the securities had been underwritten.

Ymir.—Return for March: 35 stamps ran 29 days and crushed 2,600 tons (2,000 lbs.) of ore, producing 616 oz. bullion; estimated realisable value (gross) of the product, $6,750; 170 tons of concentrates shipped, of a gross estimated value of $3,750; cyanide plant treated 2,100 tons (2,000 lbs.) of tailings producing bullion having an estimated gross value of $1,300; sundry revenue, $287; total revenue, $12,087; working expenses, $11,410; profit $677. There has been expended during month on development, $100.

MINING AND INDUSTRIAL SHARE MARKET.

There has been quite a movement recently in War Eagle and Centre Star shares, as it is anticipated that the amalgamation will be beneficial to both properties. The silver-lead mines are also in request, and there has been considerable quiet buying of Rambler Cariboo, in fact the whole mining situation is improving, and it will not be surprising if the public interest in mines will be to the fore before a great while. Industrials have been fairly active, but on the whole show a shrinkage in values from last month. This is not due to any change of earning power in these companies, but to the fact that speculative market conditions have been more or less on the bear side.

The following list shows the quotations for the week ending Friday, May 26th, as supplied to the Review by **Robert Meredith & Co., 57 St. Francois Xavier Street, Montreal:—**

Par value of shares		Asked.	Bid.
.10	Canadian Gold Fields Syndicate	.05¼	.05
1.00	Centre Star	.28	.27½
1.00	Deer Trail Consolidated	.02	—
1.00	Giant	.03½	.01
10.00	Granby Consolidated	5.75	5.50
10.00	Montreal and Boston	1.00	—
1.00	North Star	.02	—
1.00	Payne	.02	.01
1.00	Rambler Cariboo	.20	.15
1.00	Republic	.03½	—
1.00	St. Eugene	.50	.47
1.00	War Eagle	.16	.14½
1.00	White Bear	.04	—
100.00	Nova Scotia Steel (common)	61.00	60.50
100.00	Ditto ditto (preferred)	—	—
100.00	Diminion Coal (common)	77.00	75.00
100.00	Ditto ditto (preferred)	—	—
100.00	Dominion Iron and Steel (common)	22.50	20.00
100.00	Ditto ditto ditto (preferred)	68.75	66.50
——	Ditto ditto ditto (bonds)	84.00	83.50

BRITISH COLUMBIA LEAD OUTPUT.

For the first nine months of the present fiscal year, that is, up to April 1st, the total lead output of the Kootenays has been 19,020 tons, and the bounty paid by the Government during the period mentioned amounted to $259,365. Of the total output, 13,291 tons were treated at home smelters and 5,729 tons were exported to foreign plants.

THE COPPER MARKET SITUATION.

Messrs. D. Houston & Co.'s copper circular says in part:

"Although sellers' quotations remain about 15¼ for lake and electrolytic, these figures are considered nominal, and there are no indications at the moment of any general movement to stock up liberally as yet. Some offers to sell have been made at 15 cents, but large holders quote higher figures

"Current production for some time to come is largely sold, and with important contracts still running, the leading producers refrain from pressing sales. Domestic consumption and exports are absorbing fully 40,000 tons of copper a month, and while these conditions last it is hardly reasonable to expect the market to turn radically or permanently weak, unless some over-anxious seller undertakes to force business. The situation will require to change essentially before a violent reaction in prices is justified. A moderate readjustment of values later may possibly be necessary to stimulate buying, and the trend of affairs may result in creating a somewhat different basis for negotiating new business. But while demand is maintained at the present level it would be unwise to anticipate a return to prices anything like those prevailing when trade and business were suffering from acute depression. The situation is a waiting one, but meanwhile deliveries for consumption are very large, and they will continue to be so for several weeks to come to fulfill engagements already made. The production of crude copper undoubtedly shows some increase over last year, but refineries are understood to be operating up to their limit, and with no increase in capacity reported at the leading refining plants the available quantity of fine metal cannot be increased with existing facilities.

"Anent the important Chinese demand for copper which has arisen within the past year, we have direct information from an excellent authority in China on the subject. From the advices received we are able to state that the increased demand for American copper in China is due to two reasons. In the first place, the coinage of a new issue of copper coins is under way in that empire, and the Chinese have established a number of large mints for making the coin which they call a ten cash piece. These coins have become extremely popular, and a great quantity will be required to meet the demand. Additional requirements have been created by the construction of several cartridge case factories for the government.

"European consumers have shown reserve in making new commitments of magnitude lately, also, and they have been drawing largely on their stocks, or depending on deliveries falling due to supply current necessities. It would appear, therefore, that both the American and foreign markets are ripe for extensive business whenever prices impress buyers as satisfactory."

Messrs. Henry R. Merton and Co. have published their statistics of the world's copper production for 1904. The aggregate output was 613,125 tons for twelve months, comparing with 574,740 tons for the preceding year, 541,295 tons for 1902, 516,628 tons for 1901, and 479,514 tons for 1900. The production in 1888 was 258,026 tons, and ten years ago it was 324,505, the quantity per annum having nearly doubled during the last decade. Of last year's total the United States of America produced 334,170 tons, and 47,035 tons came from Spain and Portugal, 50,945 tons from Mexico, 34,160 tons from Australasia, and 30,110 tons from Chili. Ten years ago the Australasian supply was only 9,000 tons.

THE MARKET FOR ASBESTOS.

Commenting on the registration of a syndicate for mining asbestos in the Transvaal, "South African Mines" (Johannesburg), states that samples submitted to experts in England and America have brought the response that there is a ready market for this class of material, the transatlantic price current being £15 per ton, and that of England £25.

The consulting engineer assumes that the syndicate has from an inch and a-half to four inches over its area, and if the affiliated rocks are not too hard, no fears are entertained regarding the profitable aspects.

THE GOLD YIELD OF 1904.

Some of our European contemporaries have been collecting data as to the output of the precious metal in 1904. The entire yield is reported to be:—

Australasia	$87,500,000
United States (and Alaska)	86,500,000
South Africa	85,000,000
Russia	22,500,000
Canada	16,500,000
Mexico	11,000,000
India	10,500,000
All others	34,500,000
Total	$335,000,000

The predictions are for an increasing supply during the next five years with a maximum of $450,000,000. The Transvaal is to supply the bulk of this increase, its annual amount being placed at $150,000,000. These authorities put the Yukon, Colorado and Australia as on the decline in production.

INDUSTRIAL NOTES.

The Montreal Steel Co. is about to enlarge its plant. It has been found that another department will have to be added to the works, to manufacture a certain kind of steel employed in various Canadian industries, amongst others by the Canada Car Co., etc.

The St. Eugene Mining Company has ordered a new 30-drill compressor from the Jenckes Machine Company. This machine is to be shipped, installed and in running order by the first of August. This additional equipment will provide 50 drills, there being now in use compressor capacity for 20 rock drills.

Another recent sale made by the Canadian Westinghouse Company, Limited, was that of a 500 k.w. enclosed type turbo-generator unit to the Canadian Pacific Railway Company. This unit is to be installed at Fort William, on the Canadian Pacific, and is to be used for supplying power to the various grain elevators at that point. The unit is to operate 3 phase, 600 volt, 7,200 alternations, 3,600 r.p.m.

According to the Rossland Miner, Mr. W. H. Aldridge, manager of the Canadian Smelting Works, at Trail, states that the capacity of the lead refinery at Trail is to be trebled to meet the demands made for the pig lead and silver which are produced there. In the past, a large amount of the silver and lead produced there has been exported from the works to the Orient, and when the output is increased this work will grow considerably.

The Molly Gibson, which is developing in a very satisfactory manner, is, so it is said, about to install a concentrator to treat the low grade ore, and to remove zinc to avoid a penalty at the smelters. The high grade ore will be shipped to the smelter for treatment as before. The company has recently been reorganized, and its affairs now permit of immediate prosecution of the plans outlined. The new company now controlling the Molly Gibson mine is the La Plata Silver Company.

Among recent contracts awarded to Allis-Chalmers-Bullock, Limited, Montreal, were three 450 h.p. induction motors, one 100 h.p. induction motor, rope driven, for use in the Royal and Glenora mills of the Ogilvie Milling Co.; six type E-24 Ingersoll-Sergeant rock drills for the British Columbia Copper Co.; two Ingersoll-Sergeant submarine drills for the Montreal Harbor Commissioners; one Gates X Crusher, with engine and other equipment, to Michael Connolly, for his contract at St. Raymond, Que.

In our Industrial Notes of last month we announced that the new thirty drill compressor which the St. Eugene Consolidated Mining Company had purchased, was from the Jenckes Machine Company, Sherbrooke, P.Q.; this is an error, and the sale should have been credited to the Canadian Rand Drill Company, of the same place. The Jenckes Company do not build compressors, and the error was therefore patent to those who knew either of the above firms. The quality of the compressors built by the Canadian Rand Drill Company is too well known to need further announcement.

The Westinghouse Machine Company has recently announced substantial extensions in its sales organization. These extensions are the result of the rapidly increasing business, making necessary the more thorough covering of southern and western territory. In addition to the original New York, Boston, Pittsburg and Chicago offices, new branches have been established at Cincinnati, Denver, San Francisco, Charlotte, N.C., and Atlanta, Ga. With these added facilities, the extensive mining territory of the West and cotton industries of the South may receive more active attention. The steam turbine and gas engine business of the company has increased rapidly during the last few years, and the prevailing activity in this branch of power development augurs well for the future.

Mr. H. H. Henshaw has been appointed general manager of Allis-Chalmers-Bullock, Limited, Montreal. Born at St. Hyacinthe, in 1865, he first entered the office of Mr. Walker, chief accountant of the Grand Trunk, in 1880. He remained there until 1886, when he was appointed secretary-treasurer of the Royal Electric Co. During the next four years, when the company carried on its manufacturing department, Mr. Henshaw came in contact with manufacturers, electricians and engineers all over the country, and after it disposed of its manufacturing interests he not only retained his relations with them but made many new acquaintances in the business world. He remained as secretary-treasurer of the company until its absorption in the Montreal Light, Heat & Power Co., of which he also became secretary-treasurer, and remained in that position until the present appointment.

The business of Allis-Chalmers-Bullock, Limited, Montreal, has increased so rapidly recently that it has been necessary to make a number of important additions to the staff. Mr. T. F. Kenny has been appointed Mechanical Engineer. He graduated from the Department of Mechanical Engineering at McGill University in 1896, and then spent two years with the British Columbia Iron Works. For the past six years he was Mechanical Engineer for the Jenckes Machine Co. Mr. James F. Forbes has been appointed to take charge of the Pumping Engine Department. He is a native of Philadelphia, and has had large experience with the water companies owned by the Delaware Company, of New Jersey. Later he became superintendent at Dennison and Uhricksquille, and had charge of the construction of a slow sand filter plant and also of a mechanical gravity filter plant. Under his superintendence the pumping facilities were largely increased and rearranged to suit the filter plant. Since 1902 he has been travelling salesman with the National Meter Company, making Chicago his headquarters.

The Abner Doble Company, of San Francisco, announces that arrangements have been made with the John MacDougall Caledonian Iron Works Company, Limited, of Montreal, Canada, whereby the latter become sole licensees for the manufacture of the Doble system of water wheels in the Dominion of Canada. The tangential water wheels and needle regulating nozzles manufactured by the Abner Doble Company are well known for their excellence of design and workmanship, and considerable engineering interest has recently been shown in relation to the four 8,000 horse-power wheels which that company has built for operation in California power plants. The McDougall Company have the most extensive machine works in Canada, their plant including machine shops, pattern shop, foundry, forging works and structural material shop. Their plant is therefore well equipped for the manufacture of water wheels and other hydraulic machinery. They already have in hand the building of a 100 horse-power wheel to operate under 170 feet head, taking water through a 3½-inch jet, and having a speed of 130 revolutions per minute. The Canadian licensees are prepared to furnish the steel pipe, structural work, and all machinery necessary for complete power plant, and the Doble Company requests that all engineers or parties interested in water power developments in Canada address the McDougall Company direct. They have retained the Abner Doble Company as their consulting engineers.

REPORT ON PATENTS—APRIL.

(Specially Reported for the Canadian Mining Review.)

787,736.—Filtering-Cell for Separating Slimes in Ore Treatment. Gustavus A. Duncan, Deadwood, S. D. In combination with a filtering-bag, a frame lodged in the bag for holding it extended, comprising vertical spacing-bars at relatively short intervals in the length of the cell; nipples set through the bottom bar of such frame and extending through the bottom of the bag and made water-tight thereat, and an exhaust and supply pipe to which such nipples are connected, extending underneath the cell.

787,878.—Process of Treating Slimes in Ore Reduction. Gustavus A. Duncan, Deadwood, S. D. A process which concists in accumulating the slimes upon the exterior of a filtering-cell immersed in the slime-bearing liquid, by suction from within the cell and exhausting the liquor from about such accumulated slimes, surrounding the cell having the slimes thus accumulated thereon with fresh metal solvent liquor, and drawing such liquor by suction within the cell through the slimes so accumulated on its exterior, and subsequently detaching the residual slimes from the cell.

787,540.—Process of Roasting Ores. Seely B. Patterson, Phillipsburg, N. J. A process which consists in establishing and continuously roasting a body of ore, intermittently feeding charges to the top of the body, intermittently subjecting the body throughout its length to the action of hot air, in the intervals repeatedly subjecting the lower portions of the body that have been subjected to the hot air to the action of steam, and withdrawing the roasted ores from the base of the body.

787,604.—Ore-Crusher. Frederick E. Woodbury, Milwaukee, Wis. The combination with an ore-crusher comprising a receptacle in which ore is crushed, means for crushing the ore and a grate through which the pulp is discharged, of a catch-box having an opening into said receptacle inside the grate, an opening below provided with a screen, and means for producing an upward pulsating current of water through said screen and catch-box into said receptacle.

787,814.—Separation of Metals from their Ores. Jacob D. Wolf, London, England. A process which consists in agitating pulps with oil until the oil has taken up all the metallic-mineral contents with some gangue, separating the mineral-bearing oil from the pulps, removing suspended particles of gangue from the oil by passing it through warm water and separating metallic minerals from the oil.

April 25,1905.

788,315.—Method of Electrolytic Separation. William Hoopes, Pittsburg, Pa. A method of separating metal electrolytically, which consists in passing an electric current through a solution of a compound of such metal in anhydrous ammonia, and applying a refrigerating medium to the solution to prevent or retard evaporation of the solvent.

788,211.—Combined Dredge and Mining-Sluice. Charles H. Lewis, Baltimore, Md. A combined dredge and mining-sluice, which comprises a rotatable vessel provided at or near its forward end, with a series of angularly-placed and projecting scoops in communication with the interior of the vessel, and having at its rear end an out-opening.

788,330.—Apparatus for the treatment of Ores. Robert G. Reilly, Albuquerque, N. Mex., assignor of two-thirds to Thomas J. Curran, Albuquerque, N. Mex. A vertical smelting-chamber comprising a lower and an upper section, the lower section being provided with lateral apertures above thereof, air-chambers adjacent to the lower section and communicating with the said apertures, air-chambers adjacent to the upper section, means for forcing cold air into the said upper and lower air-chambers, and agitating devices arranged in the upper air-chambers and having bars aranged to project through apertures in the walls of the upper section of the smelting-chamber.

787,926.—Process of Treating Iron, Cast-Iron and Steel. Jean Lecarme, Paris, France. The process of hardening and transforming into steel of variable qualities the entire or part of the surface of objects, rotary cutters, screw taps and other tools, and bells and other sonorous instruments made of iron, cast-iron, or mild steel, said process consisting of coating the objects on the surfaces or parts to be treated with a composition containing charcoal in powder, cyanide of potassium, and a combustible agglutiant body and then heating these bodies to a bright red excluded from the air.

May 2, 1905.

788,912.—Process of Extracting Metals. John A. Just, Pulaski, N. Y., assignor to Just Mining & Extraction Co., Rochester, N. Y., a Corporation of New York. A process consisting in chlorinating the chloridized ores in the presence of acidified calcium-chloride solution, precipitating the gold and silver and separating them, and recovering the calcium-chloride solution for re-use.

788,584.—Process of Reducing Metals from their Solutions. Charles B. Jacobs, East Orange, N. J., assignor to The Ampare-Electro-Chemical Company, Port Chester, New York, a Corporation of New York. The process of separating gold from base metals in cyanide solutions containing gold and base metal, consisting in subjecting the solution to the action of gaseous phosphide of hydrogen, in the presence of free acid, thereby precipitating the gold while retaining the base metal in solution.

788,799.—Ore-Separator. Charles W. Strong, Ward, Colo. The combination of a tank for containing an amalgamating material, a grinding-bell open at its bottom and rotatable within the tank, there being an annular space between the bell and the tank, constituting a feed-space to receive the material for grinding, and grinding rollers carried by the bottom edge of the bell and travelling upon the bottom of the tank, the bottom edge of the bell being spaced above the bottom of the tank to permit of the passage there between of the material under treatment, and the bottom of the tank having a discharge located within the bell.

788,546.—Combined Smelting and Refining Furnace. Chauncey C. Medbery, New York, N. Y. The combination with a heating-chamber, of means for rotating, means for setting it in different angular positions, a fuel-supplying device connected to one end of the chamber, movable therewith and adapted to supply fuel to the chamber in all of its angular positions and while it is rotated; and an opening at the other end of the cylinder.

788,813.—Process of Treating Fine Ores. David Baker and William W. Hearne, Wayne, Pa. A process of agglomerating fine iron ores or residues, which consists in subjecting the same to a temperature which shall cause the particles thereof, due to the impurities contained therein, to fuse sufficiently to become semi-plastic and sticky, and to agitate, by rolling the mass, when in the semi-plastic state.

789,108.—Means for Promoting Combustion of Fuel. Illius A. Timmis, London, England. The combination with the combustion-chamber of a furnace having an exhaust-blast of means for forcing air into the combustion-chamber above and below the fire-bars at a pressure exceeding the suction force of the exhaust.

788,589.—Copper Smelting and Separating. George Mitchell, Los Angeles, Cal. A process which consists in subjecting the raw ore to a reducing atmosphere in a smelting furnace, fusing it therein, avoiding the chemical union of the metal with silica in the smelting-furnace, and withdrawing the molten matte.

PROVINCE OF QUEBEC

The attention of Miners and Capitalists in the United States and in Europe is invited to the

GREAT MINERAL TERRITORY

Open for investment in the Province of Quebec.

Gold, Silver, Copper, Iron, Asbestos, Mica, Plumbago, Phosphate, Chromic Iron, Galena, Etc.

ORNAMENTAL AND STRUCTURAL MATERIALS IN ABUNDANT VARIETY.

The Mining Law gives absolute security to Title, and has been specially framed for the encouragement of Mining.

Mining concessions are divided into three classes :—

1. In unsurveyed territory (*a*) the first class contains 400 acres, (*b*) the second, 200 acres, and (*c*) the third, 100 acres.

2. In surveyed townships the three classes respectively comprise one, two and four lots.

All lands supposed to contain mines or ores belonging to the Crown may be acquired from the Commissioner of Colonization and Mines (*a*) as a mining concession by purchase, or (*b*) be occupied and worked under a mining license.

No sale of mining concessions containing more than 400 acres in superficies can be made by the Commissioner to the same person. The Governor-in-Council may, however, grant a larger extent of territory up to 1,000 acres under special circumstances.

The rates charged and to be paid in full at the time of the purchase are $5 and $10 per acre for mining lands containing the superior metals* ; the first named price being for lands situated more than 12 miles and the last named for lands situated less than 12 miles from the railway.

If containing the inferior metal, $2 and $4 according to distance from railway.

Unless stipulated to the contrary in the letters patent in concessions for the mining of superior metals, the purchaser has the right to mine for all metals found therein ; in concessions for the mining of the inferior metals, those only may be mined for.

Mining lands are sold on the express condition that the purchaser shall commence *bona fide* to mine within two years from the date of purchase, and shall not spend less than $500 if mining for the superior metals ; and not less than $200 if for inferior metals. In default, cancellation of sale of mining lands

(*b*) Licenses may be obtained from the Commissioner on the following terms :—Application for an exploration and prospecting license, if the mine is on private land, $2 for every 100 acres or fraction of 100 ; if the mine is on Crown lands (1) in surveyed territory, $5 for every 100 acres, and (2) in unsurveyed territory, $5 for each square mile, the license to be valid for three months and renewable. The holder of such license may afterwards purchase the mine, paying the prices mentioned.

Licenses for mining are of two kinds: Private lands licenses where the mining rights belong to the Crown, and public lands licenses. These licenses are granted on payment of a fee of $5 and an annual rental of $1 per acre. Each license is granted for 200 acres or less, but not for more ; is valid for one year, and is renewable on the same terms as those on which it was originally granted. The Governor-in-Council may at any time require the payment of the royalty in lieu of fees for a mining license and the annual rental—such royalties, unless otherwise determined by letters patent or other title from the Crown, being fixed at a rate not to exceed three per cent. of the value at the mine of the mineral extracted after deducting the cost of mining it.

*The superior metals include the ores of gold, silver, lead, copper, nickel, graphite, asbestos, mica, and phosphate of lime. The words inferior metals include all other minerals, and ores.

The fullest information will be cheerfully given on application to

THE MINISTER OF LANDS, MINES AND FISHERIES,
PARLIAMENT BUILDINGS, QUEBEC.

Ontario's Mining Lands..

THE Crown domain of the Province of Ontario contains an area of over 100,000,000 acres, a large part of which is comprised in geological formations known to carry valuable minerals and extending northward from the great lakes and westward from the Ottawa river to the Manitoba boundary.

Iron in large bodies of magnetite and hematite: copper in sulphide and native form; gold, mostly in free milling quartz; silver, native and sulphides; zincblende, galena, pyrites, mica, graphite, talc, marl, brick clay, building stones of all kinds and other useful minerals have been found in many places, and are being worked at the present time.

In the famous Sudbury region Ontario possesses one of the two sources of the world's supply of nickel, and the known deposits of this metal are very large. Recent discoveries of corundum in Eastern Ontario are believed to be the most extensive in existence.

The output of iron, copper and nickel in 1903 was much beyond that of any previous year, and large developments in these industries are now going on.

In the older parts of the Province salt, petroleum and natural gas are important products.

The mining laws of Ontario are liberal, and the prices of mineral lands low. Title by freehold or lease, on working conditions for seven years. There are no royalties.

The climate is unsurpassed, wood and water are plentiful, and in the summer season the prospector can go almost anywhere in a canoe.

The Canadian Pacific Railway runs through the entire mineral belt.

For reports of the Bureau of Mines, maps, mining laws, etc., apply to

HONORABLE E. J. DAVIS,
Commissioner of Crown Lands,

or

THOS. W. GIBSON,
Director Bureau of Mines,
Toronto, Ontario.

Dominion of Canada

SYNOPSIS OF REGULATIONS

For disposal of Minerals on Dominion Lands in Manitoba, the North-west Territories and the Yukon Territory.

COAL.

Coal lands may be purchased at $10 per acre for soft coal and $20 for anthracite. Not more than 320 acres can be acquired by one individual or company. Royalty at the rate of ten cents per ton of 2,000 pounds shall be collected on the gross output.

QUARTZ.

Persons of eighteen years and over and joint stock companies holding free miner's certificates may obtain entry for a mining location.

A free miner's certificate is granted for one or more years, not exceeding five, upon payment in advance of $7.50 per annum for an individual, and from $50 to $100 per annum for a company, according to capital.

A free miner, having discovered mineral in place, may locate a claim 1500 x 1500 feet by marking out the same with two legal posts, bearing location notices, one at each end on the line of the lode or vein.

The claim shall be recorded within 15 days if located within ten miles of a mining recorder's office, one additional day allowed for every additional ten miles or fraction. The fee for recording a claim is $5.

At least $100 must be expended on the claim each year or paid to the mining recorder in lieu thereof. When $500 has been expended or paid, the locator may, upon having a survey made, and upon complying with other requirements, purchase the land at $1.00 an acre.

Permission may be granted by the Minister of the Interior to locate claims containing iron and mica, also copper, in the Yukon Territory of an area not extending 160 acres.

The patent for a mining location shall provide for the payment of a Royalty ot 2½ per cent. of the sales of the products of the location.

PLACER MINING.

Manitoba and the N. W. T., excepting the Yukon Territory.—Placer mining claims generally are 100 feet square; entry fee $5, renewable yearly. On the North Saskatchewan River claims are either bar or bench, the former being 100 feet long and extending between high and low water mark. The latter includes bar diggings, but extends back to the base of the hill or bank, but not exceeding 1,000 feet. Where steam power is used, claims 200 feet wide may be obtained.

Dredging in the rivers of Manitoba and the N. W. T., excepting the Yukon Territory.—A free miner may obtain only two leases of five miles each for a term of twenty years, renewable in the discretion of the Minister of the Interior.

The lessee's right is confined to the submerged bed or bars of the river below low water mark, and subject to the rights of all persons who have, or who may receive entries for bar diggings or bench claims, except on the Saskatchewan River, where the lessee may dredge to high water mark on each alternate leasehold.

The lessee shall have a dredge in operation within one season from the date of the lease for each five miles, but where a person or company has obtained more than one lease one dredge for each fifteen miles or fraction is sufficient. Rental, $10 per annum for each mile of river leased. Royalty at the rate of two and a half per cent. collected on the output after it exceeds $10,000.

DREDGING IN THE YUKON TERRITORY.

Six leases of five miles each may be granted to a free miner for a term of twenty years, also renewable.

The lessee's right is confined to the submerged bed or bars in the river below low water mark, that boundary to be fixed by its position on the 1st day of August in the year of the date of the lease.

The lessee shall have one dredge in operation within two years from the date of the lease, and one dredge for each five miles within six years from such date. Rental, $100 per mile for first year and $10 per mile for each subsequent year. Royalty, same as placer mining.

PLACER MINING IN THE YUKON TERRITORY.

Creek, gulch, river and hill claims shall not exceed 250 feet in length, measured on the base line or general direction of the creek or gulch, the width being from 1,000 to 2,000 feet. All other placer claims shall be 250 feet square.

Claims are marked by two legal posts, one at each end, bearing notices. Entry must be made within ten days, if the claim is within ten miles of mining recorder's office. One extra day allowed for each additional ten miles or fraction.

The person or company staking a claim must hold a free miner's certificate.

The discoverer of a new mine is entitled to a claim of 1,000 feet in length, and if the party consists of two, 1,500 feet altogether, on the output of which no royalty shall be charged, the rest of the party ordinary claims only.

Entry fee, $10. Royalty at the rate of two and one-half per cent. on the value of the gold shipped from the Yukon Territory to be paid to the Comptroller.

No free miner shall receive a grant of more than one mining claim on each separate river, creek or gulch, but the same miner may hold any number of claims by purchase, and free miners may work their claims in partnership by filing notice and paying fee of $2. A claim may be abandoned, and another obtained on the same creek, gulch or river, by giving notice and paying a fee.

Work must be done on a claim each year to the value of at least $200. A certificate that work has been done must be obtained each year; if not, the claim shall be deemed to be abandoned, and open to occupation and entry by a free miner.

The boundaries of a claim may be defined absolutely by having a survey made and publishing notices in the Yukon Official Gazette.

PETROLEUM.

All unappropriated Dominion Lands in Manitoba, the North-West Territories and within the Yukon Territory are open to prospecting for petroleum, and the Minister may reserve for an individual or company having machinery on the land to be prospected, an area of 640 acres. Should the prospector discover oil in paying quantities, and satisfactorily establish such discovery, an area not exceeding 640 acres, including the oil well and such other land as may be determined, will be sold to the discoverer at the rate of $1.00 an acre subject to royalty at such rate as may be specified by order-in-council.

Department of the Interior.

Ottawa, February, 1904.

W. W. CORY,
Deputy of the Minister of the Interior.

PROVINCE OF NOVA SCOTIA.

Leases for Mines of Gold, Silver, Coal, Iron, Copper, Lead, Tin

—AND—

PRECIOUS STONES.

TITLES GIVEN DIRECT FROM THE CROWN, ROYALTIES AND RENTALS MODERATE.

GOLD AND SILVER.

Under the provisions of Chap. 1, Acts of 1892, of Mines and Minerals, Licenses are issued for prospecting Gold and Silver for a term of twelve months. Mines of Gold and Silver are laid off in areas of 150 by 250 feet, any number of which up to one hundred can be included in one License, provided that the length of the block does not exceed twice its width. The cost is 50 cents per area. Leases of any number of areas are granted for a term of 40 years at $2.00 per area. These leases are forfeitable if not worked, but advantage can be taken of a recent Act by which on payment of 50 cents annually for each area contained in the lease it becomes non-forfeitable if the labor be not performed.

Licenses are issued to owners of quartz crushing mills, who are required to pay Royalty on all the Gold they extract at the rate of two per cent. on smelted Gold valued at $19 an ounce, and on smelted Gold valued at $18 an ounce.

Applications for Licenses or Leases are receivable at the office of the Commissioner of Public Works and Mines each week day from 10 a.m. to 4 p.m., except Saturday, when the hours are from 10 to 1. Licenses are issued in the order of application according to priority. If a person discovers Gold in any part of the Province, he may stake out the boundaries of the areas he desires to obtain, and this gives him one week and twenty-four hours for every 15 miles from Halifax in which to make application at the Department for his ground.

MINES OTHER THAN GOLD AND SILVER.

Licences to search for eighteen months are issued, at a cost of thirty dollars, for minerals other than Gold and Silver, out of which areas can be selected for mining under lease. These leases are for four renewable terms of twenty years each. The cost for the first year is fifty dollars, and an annual rental of thirty dollars secures each lease from liability to forfeiture for non-working.

All rentals are refunded if afterwards the areas are worked and pay royalties. All titles, transfers, etc., of minerals are registered by the Mines Department for a nominal fee, and provision is made for lessees and licensees whereby they can acquire promptly, either by arrangement with the owner or by arbitration, all land required for their mining works.

The Government as a security for the payment of royalties, makes the royalties first lien on the plant and fixtures of the mine.

The unusually generous conditions under which the Government of Nova Scotia grants its minerals have introduced many outside capitalists, who have always stated that the Mining laws of the Province were the best they had had experience of.

The royalties on the remaining minerals are: Copper, four cents on every unit; Lead, two cents upon every unit; Iron, five cents on every ton; Tin and Precious Stones, five per cent.; Coal, 10 cents on every ton sold.

The Gold district of the Province extends along its entire Atlantic coast, and varies in width from 10 to 40 miles, and embraces an area of over three thousand miles, and is traversed by good roads and accessible at all points by water. Coal is known in the Counties of Cumberland, Colchester, Pictou and Antigonish, and at numerous points in the Island of Cape Breton. The ores of Iron, Copper, etc., are met at numerous points, and are being rapidly secured by miners and investors.

Copies of the Mining Law and any information can be had on application to

THE HON. A. DRYSDALE,

Commissioner Public Works and Mines,

HALIFAX, NOVA SCOTIA.

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makes economical mining and the deepest hole can be drilled at the smallest cost by a

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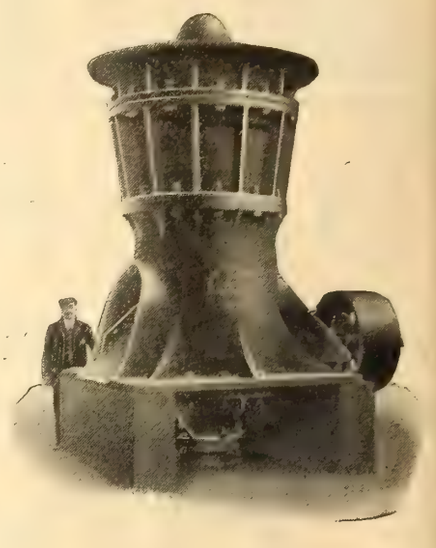

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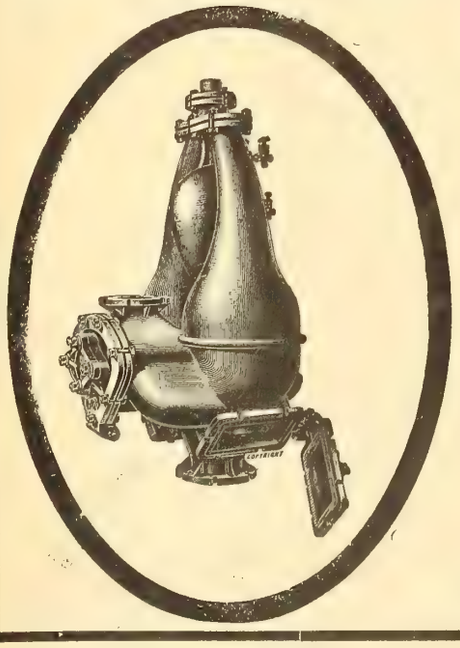

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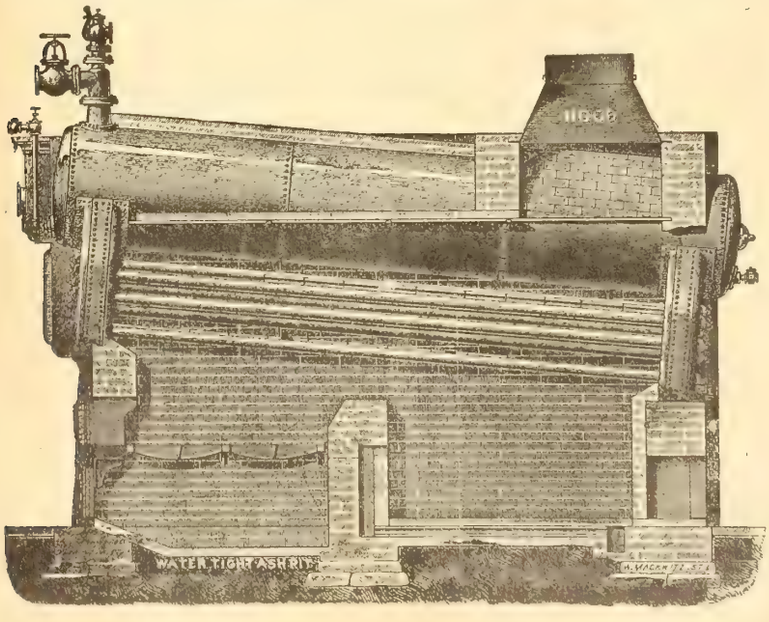

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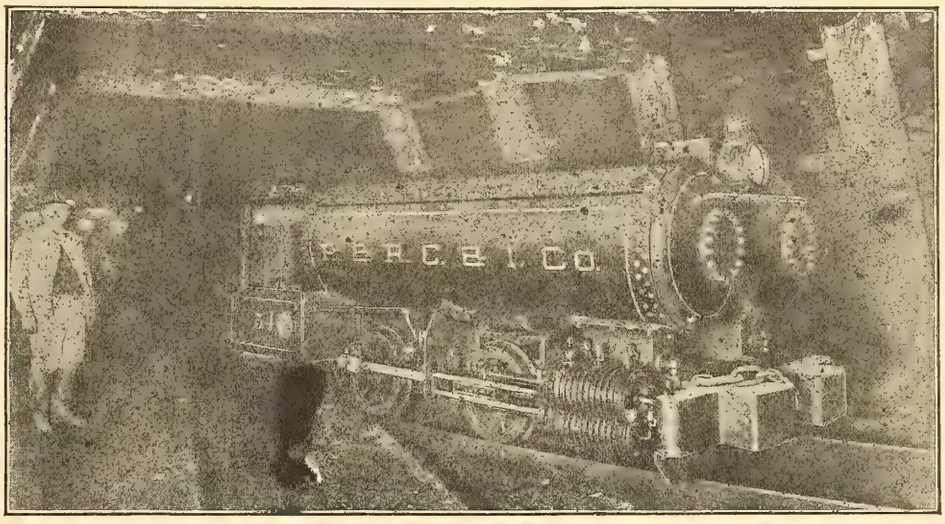

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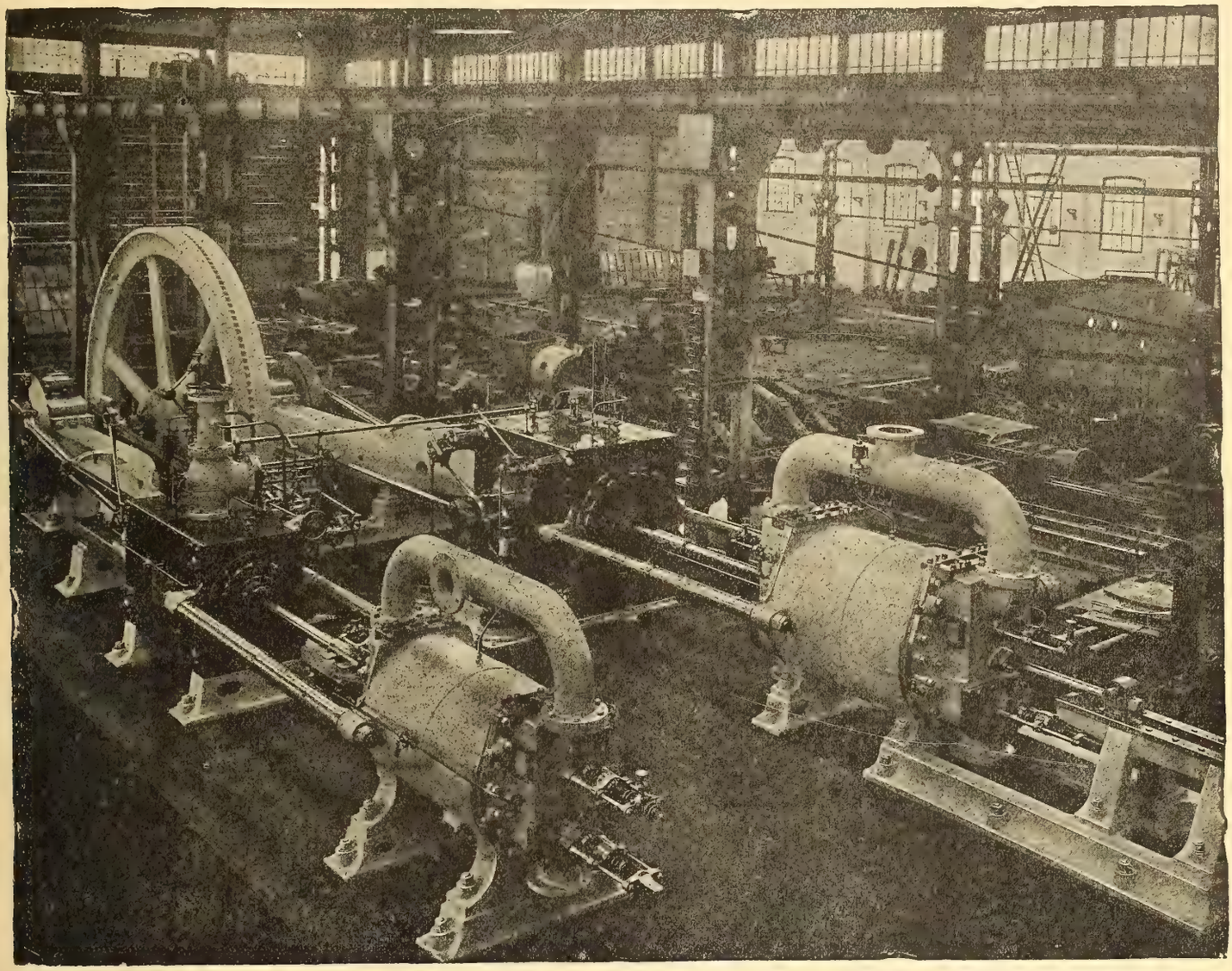

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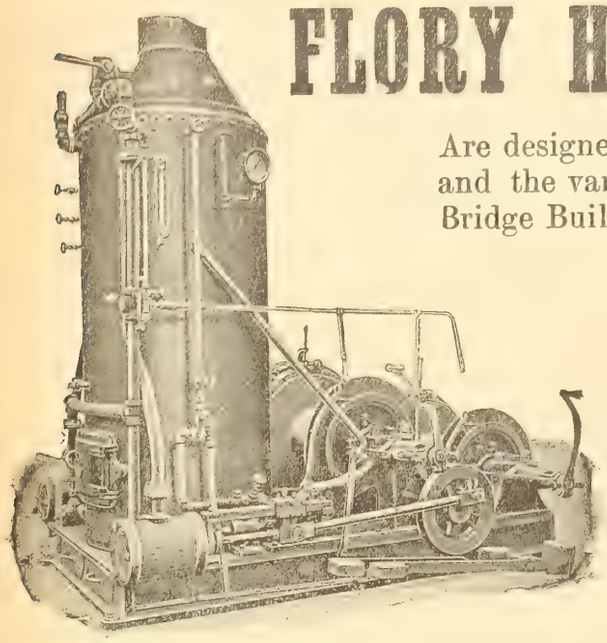

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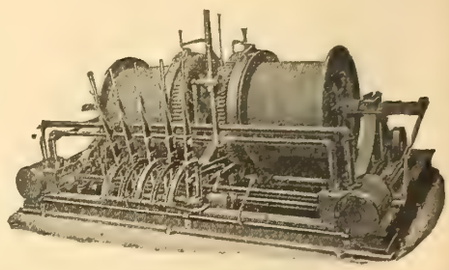

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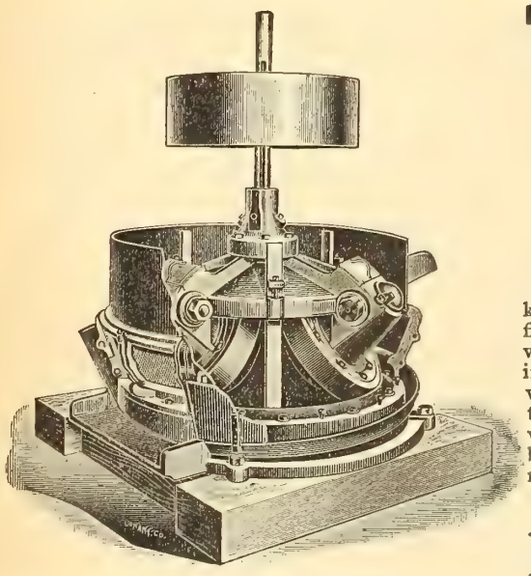

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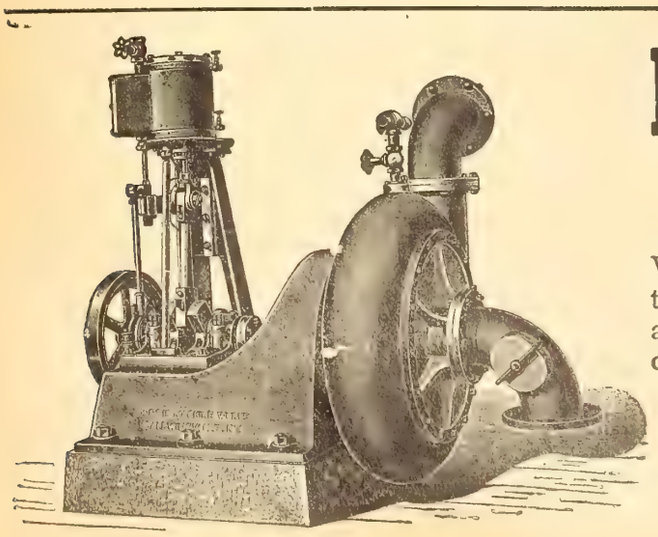

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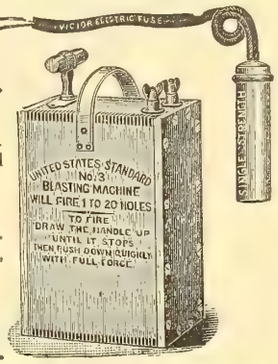

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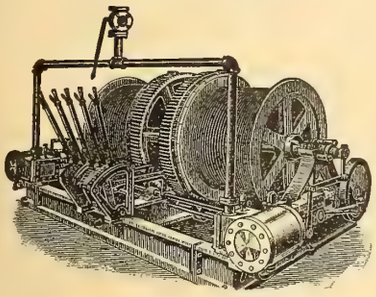

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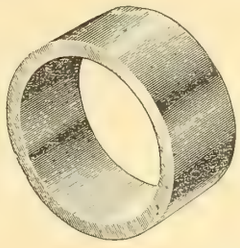

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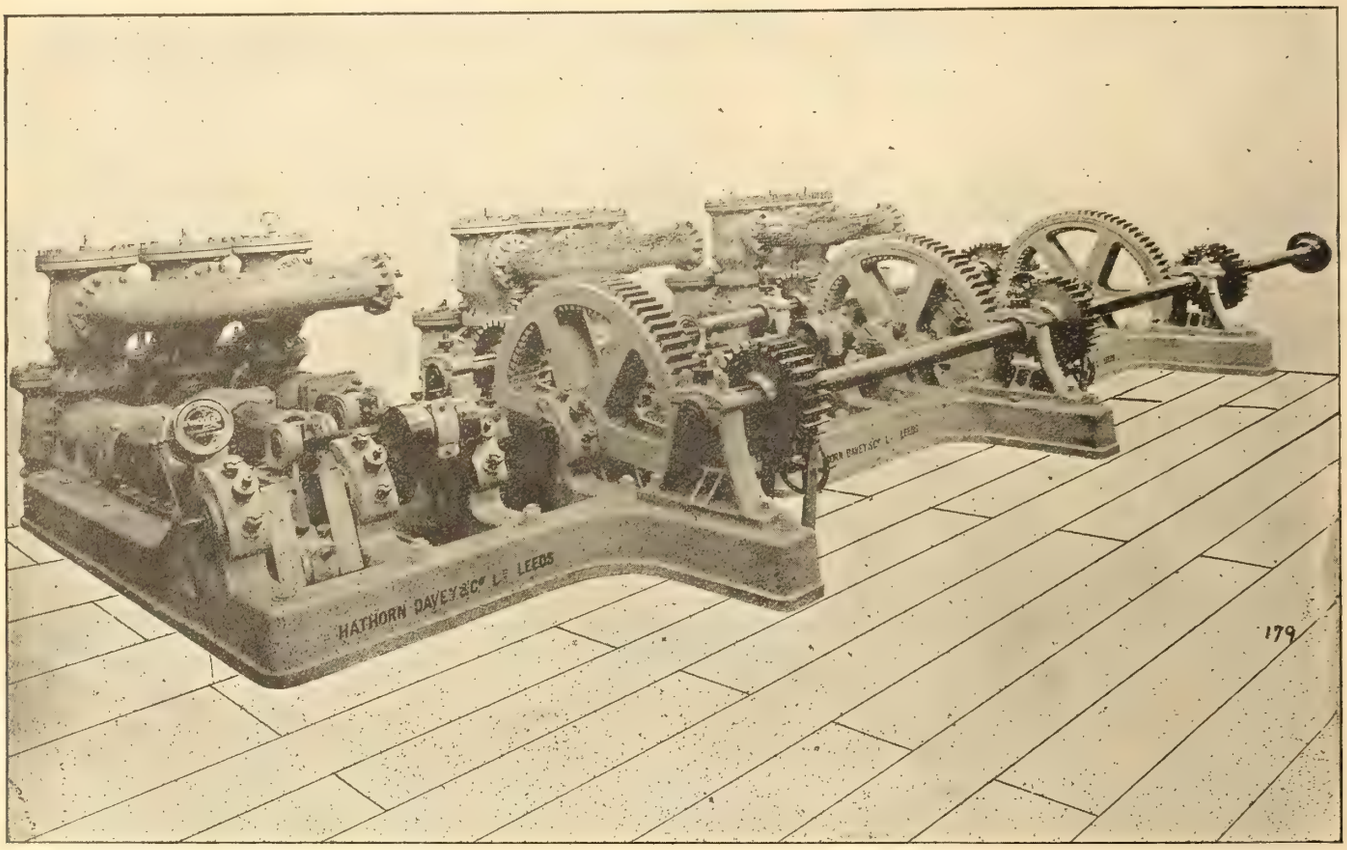

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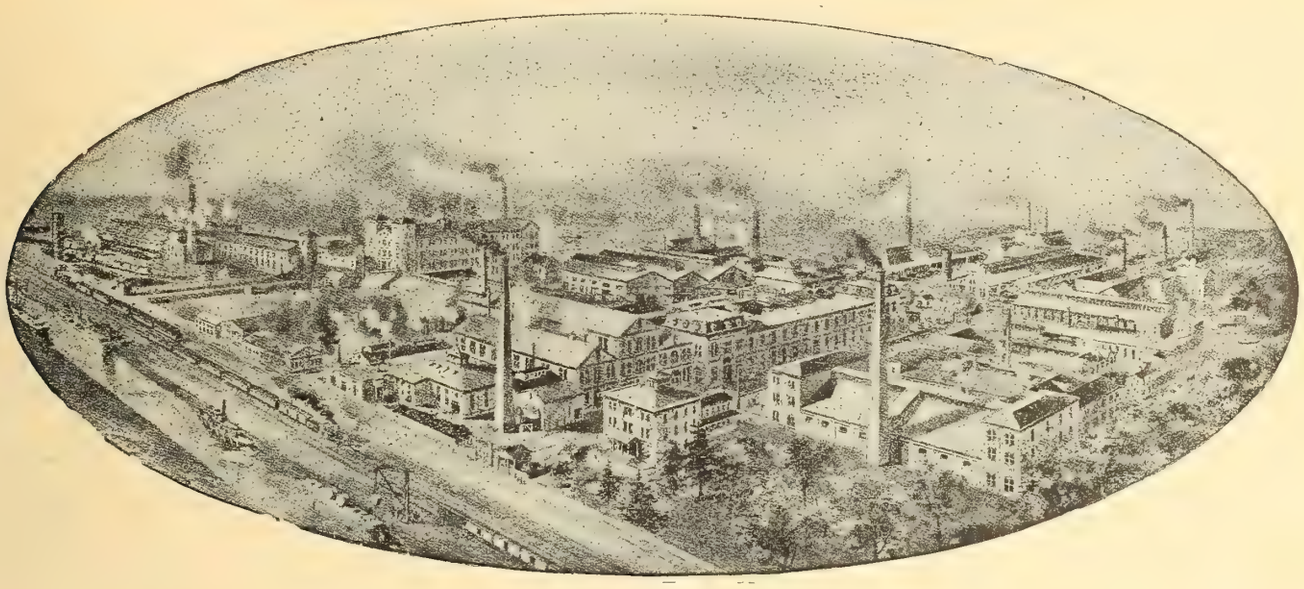

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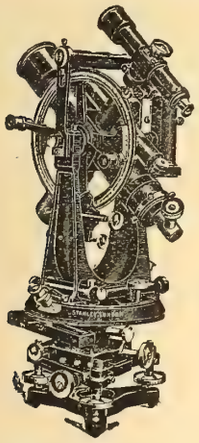

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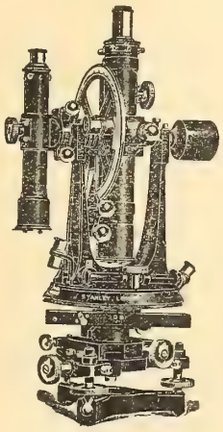

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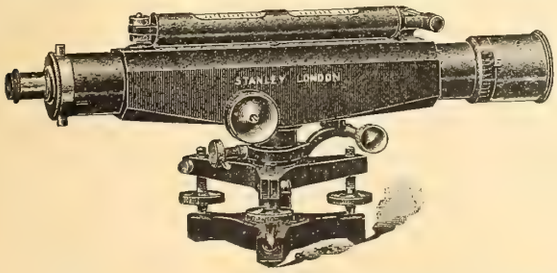

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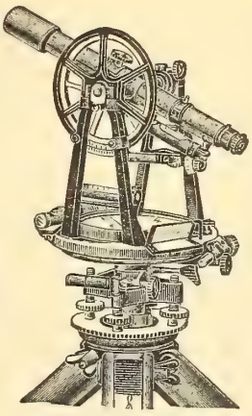

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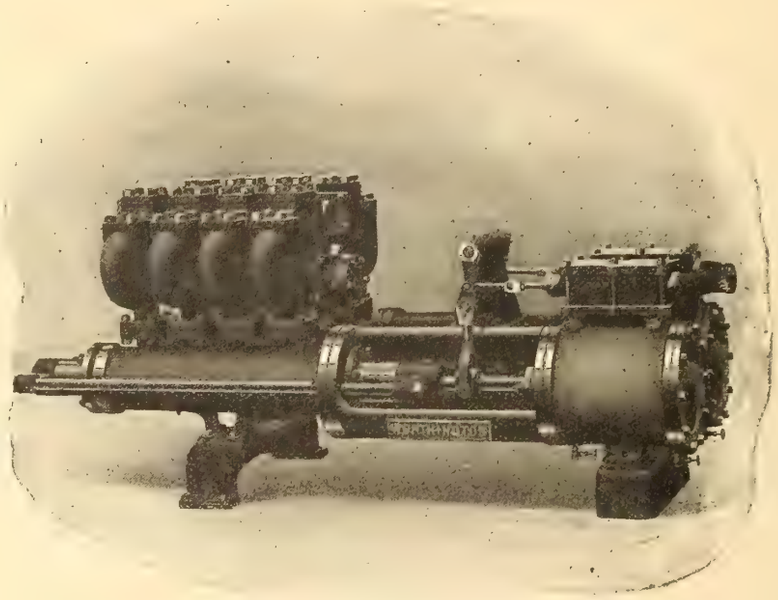

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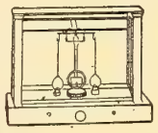

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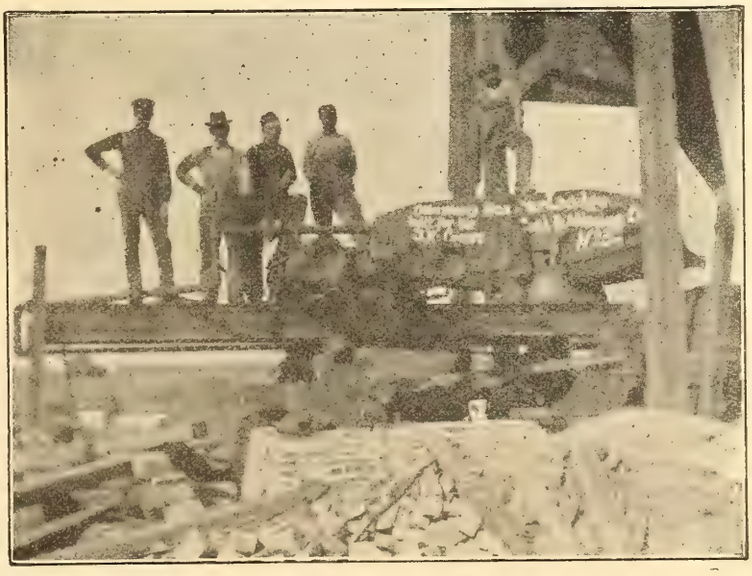

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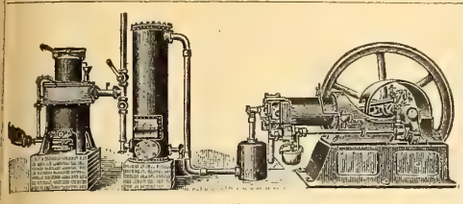

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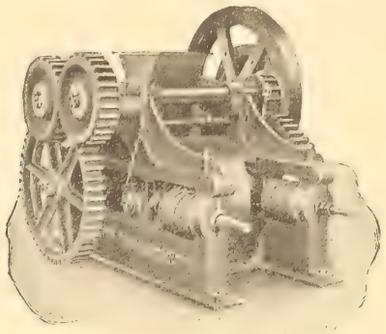

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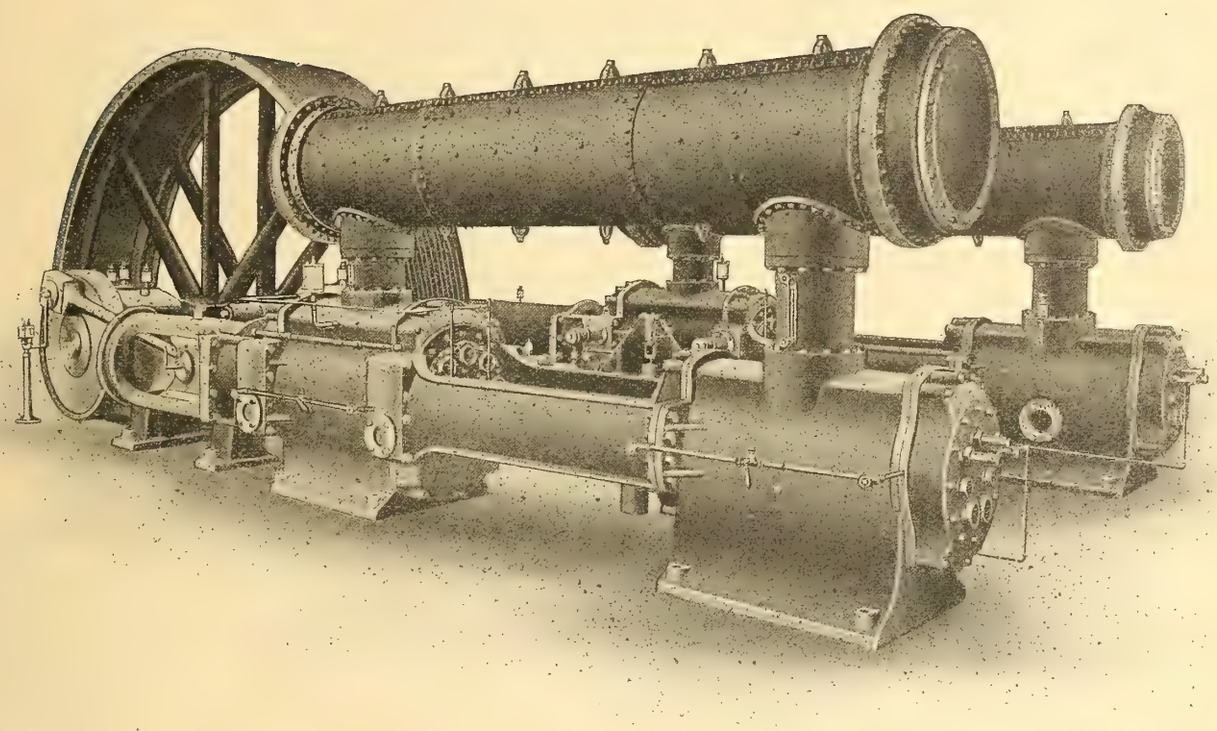

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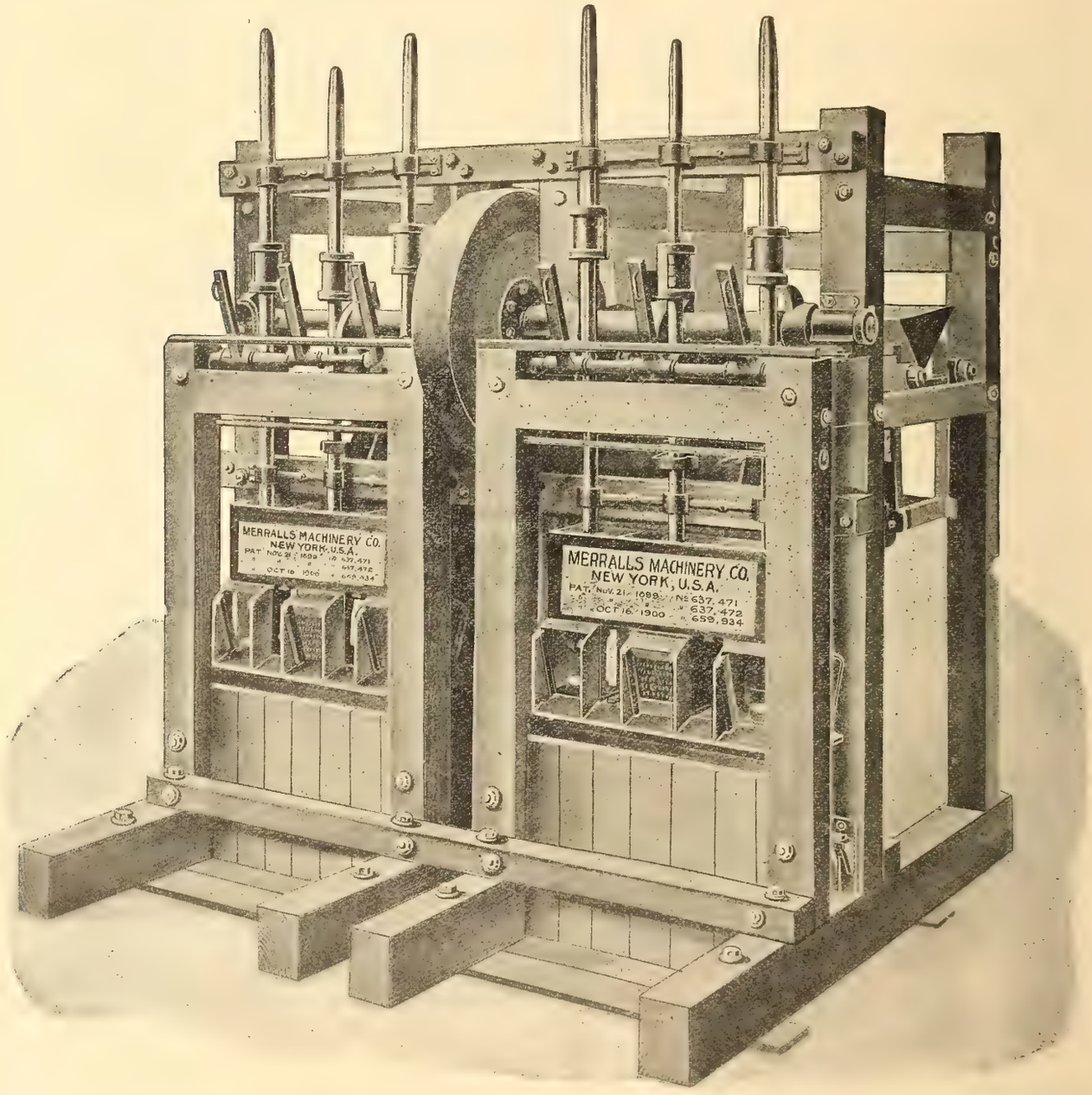

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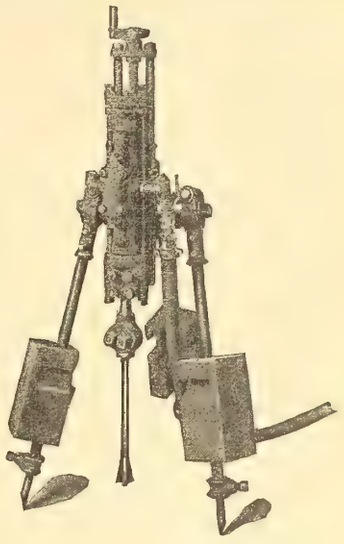

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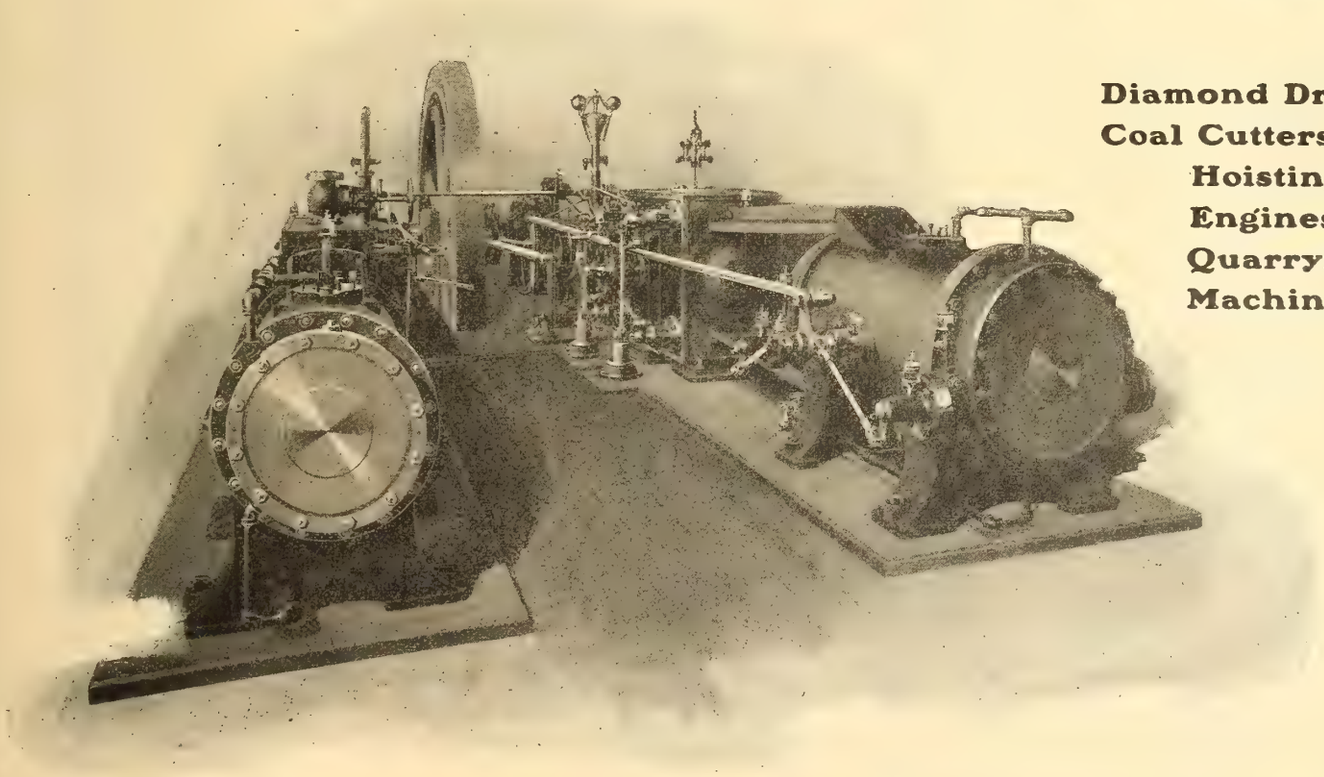

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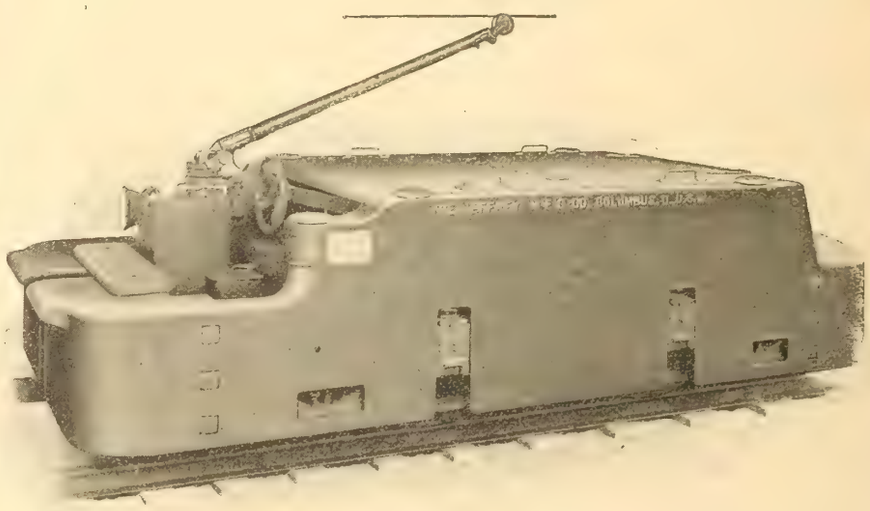

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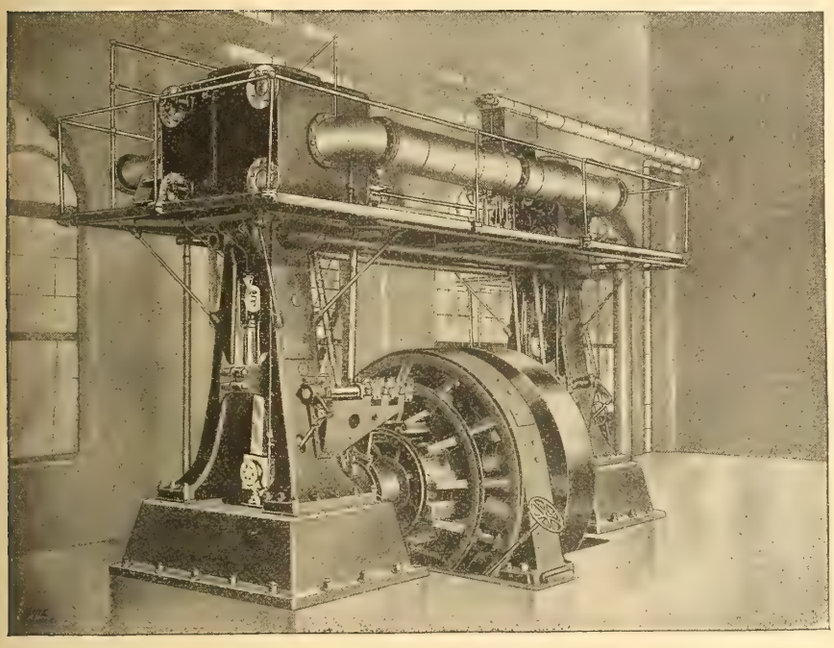

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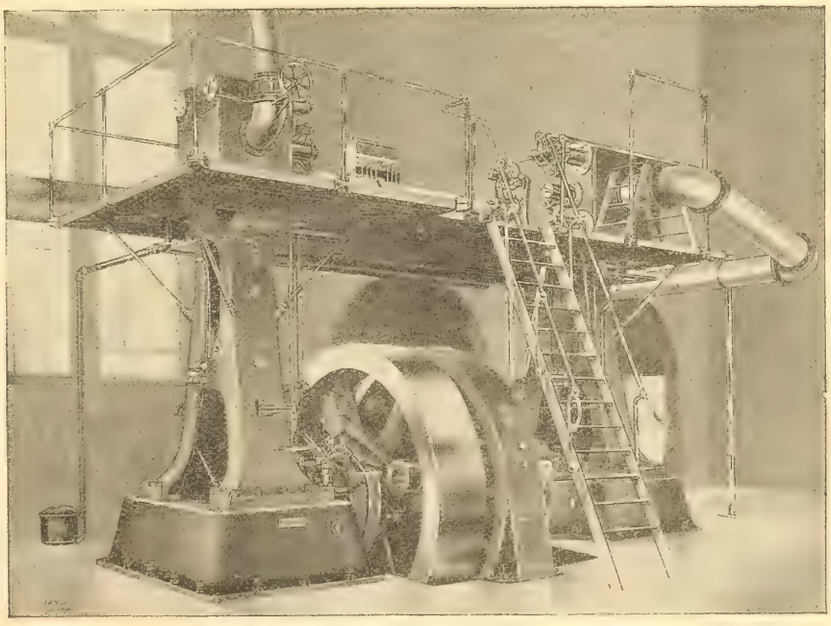

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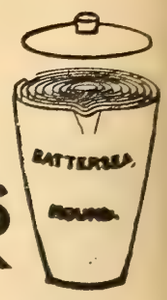

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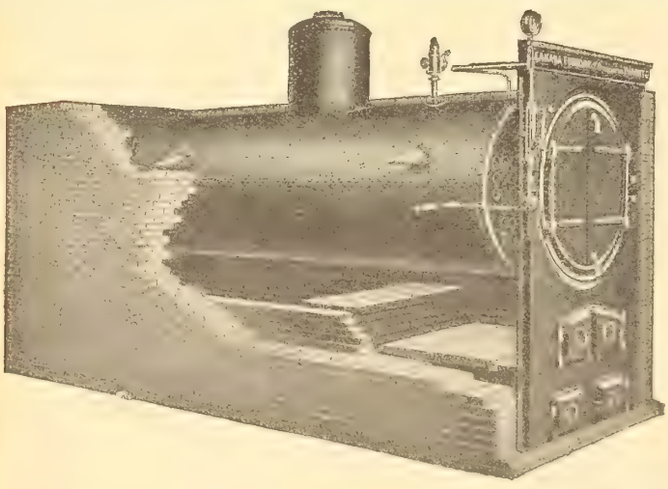

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THE BRITISH COLUMBIA MINES' REPORT.

The annual report of the Minister of Mines, just issued, reviewing mining operations in 1904 in British Columbia, is, without doubt, the most interesting and, we think, valuable, of the series published by the Department, and we have much pleasure in congratulating the Provincial Mineralogist, Mr. W. Fleet Robertson, on this excellent compilation. The report contains an extraordinary amount of information, particularly in respect to matters, which, at the present time, are demanding attention, such, for example, as the true position of the lead industry in the Kootenays, the possibilities of dredging in the more northern gold fields, and the developments of zinc mining in the Slocan. These official pronouncements will naturally attract a great deal of attention, and serve an excellent purpose. As was previously known, the mineral output of the province, during the past year, showed an increase both as regards tonnage and values; in fact, but for the exceptionally good showing made in 1901, it would have constituted a record achievement. The gross value of the 1904 output is placed at $18,977,359, or an increase equivalent to approximately 8.5 per cent. over the 1903 returns. The satisfactory feature of this increase is that it was general, every branch of industry, with the exception only of lode gold production, having contributed to the result. It is shown, however, that the increase was not equally divided in the various districts, for while during the year there was a greatly increased activity in East Kootenay, the Boundary, the Coast and the Slocan districts, the reverse was the case in Rossland and Nelson district. The gain in placer gold output was, too, largely attributable to the excellent showing made by the Atlin mines. It is, meanwhile, significant, as indicating more directly the progress that is being made, to find that the tonnage output exceeded that of 1903 by 14 per cent. This, we take it, means that not only is mining being carried on upon a larger scale, but that the problem of successfully treating lower grade ores is beginning to prove less difficult of solution. Thus, in comparing the 1904 tonnage with that of 1902, it is found that the very extraordinary increase of approximately 46 per cent. has been made, while there has been no material addition to the number of large shipping mines. In this connection it is interesting to note that considering the province as a whole, 443 tons of ore were mined for each man employed in or about the mines. Taking the individual districts, it is shown, as affording some indication of the costs of mining in different localities, that in the Slocan district an average of 114 tons per capita was mined during the year; in the Nelson district 280 tons; in the Rossland district 400 tons, while in the Boundary, where quarrying methods are largely employed, this increases to 1,121 tons per capita.

It may here be added that the Boundary now occupies an unique position among the mineral producing areas of the province, there having been mined in that section during the year, more ore than the aggregate production of all other British Columbian mining districts. This is well set out in the following table:—

	Per cent. of tonnage.	Per cent. of values.
Boundary	54.9	30.0
Trail Creek	21.3	28.0
Coast District	5.6	8.8
Fort Steele, M. D.	5.2	8.6
Nelson	5.1	3.5
Slocan	4.8	9.2

Considering the mineral production in detail, the report states that placer gold to the value of $1,115,300 or an increase of about five per cent. was made. Of this $530,000 was produced by the Atlin mines, while the Cariboo yield was about the same as that of the preceding year. Dredging for gold has not as yet proved commercially successful, on account of mechanical difficulties, which may, however, be surmounted. The lode gold production for 1904 is given as $4,589,608, or a decrease of about eight per cent., due, it is stated, to the diminished output of the Rossland and Nelson districts. In the Boundary district, however, the gross gold contents of the ore mined was about ten per cent. greater than in 1903, while, notwithstanding a decrease in the tonnage of gold-bearing ore from the Coast districts, an increase of about eight per cent. in gold values is recorded. As a result of the bounty offered by the Dominion Government on lead, a very largely increased production of this metal was made, the total output being 36,646,244 lbs., of which 21,071,236 lbs. were produced in East Kootenay; 10,611,227 lbs. in the Slocan, and 3,091,648 lbs. in the Ainsworth division, as compared with a total output of 18,089,283 lbs. in 1903. About 80 per cent. of the silver produced in British Columbia is obtained from silver-lead ores, and consequently an increased output in this metal was also made, about 50 per cent. of a total production of 3,222,481 ounces valued at $1,719,516 having been derived from the Slocan district. In copper, a further advance of about four per cent. is shown, the total output for 1904 being 35,710,128 lbs., valued at $4,578,037. The following districts contributed to this general total:

Boundary District	22,066,407	lbs.
Rossland "	7,119,876	"
Coast "	5,960,593	"
Yale-Kamloops "	328,380	"
Nelson "	220,500	"
Various Districts	14,372	"
	35,710,128	"

The average assays of the ores of the various camps, based upon copper recovered, were as follows:—Boundary Camp, 1.38 per cent. copper.; Rossland, 1.12 per cent., and Coast District, 3.68 per cent.

While as yet the production of zinc has not assumed important proportions, the recent more favorable condition in respect to the marketing of this product, have induced mine owners in the Slocan district to give the subject serious attention. Until within the last year or so, the occurrences of zinc in association with the galena ores in this district, were regarded as a detriment, as in the marketing of the lead the smelters penalized all ores carrying any considerable quantity of zinc. Now, however, most of the concentrating mills have been equipped to enable them to separate out a "zinc concentrate" from the jigs and tables. These concentrates will average from 38 to 48 per cent. zinc, in the form of blend, but also carry as impurities from 2 to 5 per cent. lead, from 5 to 15 per cent. of iron, and from 20 to 45 oz. of silver to the ton, together with a quantity of generally silicious gangue matter. Most of the smelters purchasing zinc ores are now using the Belgian furnace, in which the ore is mixed with coal or other reducing agents placed in a clay retort, the zinc being distilled off and caught in a condenser. Naturally, iron and lead are considered objectionable in this process, as they destroy the retorts, and in consequence add greatly to the cost thereof. Crude Slocan concentrates, therefore, have not been readily marketable on this account, and recently two "zinc enrichment" plants were established in the Kootenays, with a view to removing the impurities to a degree, at least, sufficiently to render them non-detrimental. The silver, however, still remains, being directly included in the zinc blende, and Mr. Robertson states that, so far as he was able to observe, no separation could be made, except by smelting, or by some other form of disintegrating the zinc blende. On this account, the price offered by ore buyers for the silver contents is very low, and mine operators therefore have so far found it advisable to allow as much zinc to pass into the lead concentrate as the smelters will accept without penalty, in which case, of course, the zinc is lost, but more than made up for by the better price obtained for the silver. It is stated, however, that there are two or three newer processes especially adapted to the treatment of ores of this character, and an electric process is being developed in Vancouver which may be utilized in small units, and thus help to solve the problem by the local treatment of the concentrates.

Coal mining in British Columbia is now developing rapidly, activity in the East Kootenay areas more than compensating for the loss sustained following the introduction of mineral oil in California for fuel purposes, by which the market of the Coast collieries' product became seriously restricted; thus in 1902 75 per cent. of Vancouver Island coal was marketed in California; in 1903 only about 45 per cent., while in 1904 this increased to about 53 per cent, the total output from the mines last year being 1,023,013 tons gross, or an increase of 20 per cent. over the 1903 returns. A still more satisfactory showing was made by the Crow's Nest Pass Coal Co., whose production for the year was 662,685 tons, of which 350,900 tons were used in the manufacture of coke. Most of this coke is sold to the Kootenay smelters, but the export trade from the United States, ascribable to the development of markets in Montana by the completion of the branch line of the Great Northern Railway into Morrissey, from 27,758 tons in 1903 to 97,690 tons in 1904. It was recently announced that the Canadian Pacific Railway had commenced the construction of a branch line to give access to the Nicola district. The coal fields in this section came into considerable notice last year, and much prospecting was done, the area being found to extend beyond the limits of its previously determined boundaries. As yet, of course, nothing beyond superficial development work has been carried on, but the quality of the coal, and its coking capabilities, from analyses made by the Provincial Government Assay Office, proves to be even better than was believed.

In the Provincial Mineralogist's notes on the general developments of the year, many matters of present interest are discussed. The first of these refers to the increased equipment of the smelting works operated by large companies in the

Boundary district. Several of these companies realizing that the oxidized ores, found in the upper portion of the ore bodies, were apt to be replaced at depth by sulphides, have consequently, either by purchase or by consolidation, acquired all available deposits carrying an excess of oxidized iron, thus securing for themselves an adequate supply of this material for fluxing purposes.

The improvement in metallurgical practice is attested by the fact that the average contents of the ore mined in this district during the past year was but 1.38 per cent. copper, $1.44 in gold and 0.3 oz in silver to the ton, upon which profits were made. It is further stated that the general costs of mining and smelting have been reduced. Another note refers to the fact that prospecting has developed new coal fields in East Kootenay, up the Elk River, while in the Telkwa Valley, in the Omineca District, what promises to be important deposits of semi-anthracite coal are reported to have been found. Much has been heard during the past year of the value of the product of the Nickle Plate mine at Hedley City, in the Similkameen, where was treated in 1904 about 10,000 tons of ore. It is somewhat disappointing, therefore, to find, in view of previous greater anticipations, that the values recovered did not exceed from $12 to $15 a ton, though, of course, this is a very good grade of ore.

The chief features of the report, however, are the special bulletins on the Atlin, Southeast Kootenay, Nelson and Slocan districts, prepared by the Provincial Mineralogist, after visiting the respective localities.

We publish elsewhere in this issue a lengthy extract contained in the report on the district first mentioned, as it appears to us to contain especially valuable information in respect to hydraulic mining conditions there. But another reference to the discovery of a curious and unusual occurrence of magnesite, found within the limits of the town of Atlin, is also worthy of note. The formation in the vicinity of the town is composed of magnesian rocks. Skirting the town site on the east is a low depression, swampy in character, in places showing "hummocks" of white magnesite, which seem to be "growing up" from the swamp level. The deposit is exposed on the surface, covering an area of several acres, and at a depth of about ten feet, to which it has been dug, continues pure and clean from all foreign matter. Mr. Robertson makes this comment:—

"This deposit was at first considered to be simply an accumulation of magnesite formed from the decomposition of the surrounding rocks and deposited by surface waters in this swamp. If such was its origin, it seems incredible that the deposit should be so free from clay and other materials, equally portable by water, and that it should be deposited in mounds above the water level. It seems probable, therefore, that the deposit is not from water, but that underlying this draw some particular stratum in the magnesium rock occurred, which, being softer, was more easily worn away, so forming the draw, and being more susceptible to the action of swamp waters carrying carbonic acid, was altered from an oxide of magnesia into the carbonate of magnesia or "magnesite," in which operation it would be greatly increased in bulk and so rise in mounds, seeming to "grow up" from below."

This deposit of magnesite was, during the year, located as a mineral claim, and some two hundred tons sent to San Francisco to be used in the manufacture of "magnesia brick," for furnace linings. It is thought, however, that the purity of the deposit would admit of it being used for other purposes, in which case it might be marketed to better advantages.

As has already been mentioned, the Government bounty on lead exercised a decided stimulating influence on this industry, but the beneficial effect was more appreciable in the case of the Southeast Kootenay industry than elsewhere. The reason given for this is that the silver-lead mines in this section of the country are capable of producing a large tonnage of ore in which the silver values are relatively low as compared with the lead contents, while the reverse is the case in the Slocan mines. The St. Eugene mine is taken as an example. Here it requires some five tons of ore to make one ton of concentrate; a ton of concentrates contains about 33 oz. of silver and 1,300 lbs. of lead, the approximate gross value, of which would be:—Silver, $16.50 and lead, $19.50. The bounty on a ton of these concentrates would be equivalent to $9.75 or nearly $2.00 per ton on the ore itself, the gross value of which, exclusive of the bounty, would be only about $7.20.

In the Slocan, however, the condition of mining is reported to be better than is implied by the increased output. Some years ago all visible ore was extracted as quickly as possible, in fact, the mines were gutted, and, in many cases, development was allowed to take care of itself. The mines, of course, lent themselves readily to this practice, as in many cases shipping ore was encountered at the surface, and could be followed down or into the hill. As Mr. Robertson states, the inevitable day of reckoning came, and it is only now that development is receiving the attention necessary to admit of the district maintaining anything like a uniform production. The report also includes, in addition to the customary excellent half-tone reproductions from photographs, a number of inserts giving the flow sheets drawn by the Provincial Mineralogist, showing in detail the operation of the principal concentrators and mills in the Slocan and East Kootenay.

MINERAL DEVELOPMENT IN NEWFOUNDLAND.

The Geological Survey of Newfoundland has issued its seventh annual report, compiled by Mr. Jas. P. Howley, F.G.S., on the mineral statistics of the Island. This report records another satisfactory increase in output; though there has been a slight falling off, both in the quantity and value of certain commodities, namely:—barite, slate, granite, building stone, etc. The total value of the raw materials of Newfoundland's last year's production is valued at $1,353,953.00, or an increase of $84,148.00 over the 1903 output. During the past four years, in fact, mining development in Newfoundland has made slow but steady progress, for example: in 1900 the total value of the mineral production was valued at $792,099.00; in 1901 it reached $1,202,272.00; in 1902, $1,217,686.00; in 1903,

$1,269,805.00, and, as already stated, in 1904, $1,353,953.00, or an average annual increase of $140,463.50. The greatest percentage of increase was in 1901, when an increase of 51.78 per cent. was shown, while the percentage last year was 6.62 per cent. On the total output the proportionate earning power of men employed in the industry is given as $570.08. Mr. Howley, in his report, expresses the opinion that these latter figures show as great an actual earning power *per capita* as that of any mining country in the world. It may be here explained that the high percentage of increase in 1901, above noted, was due to the depression in the mining industry of the island in 1900, when some of the most important properties were closed down, and the percentage of increase in 1904 is a far better indication of industrial development. The features of last year were the first shipment of talc, which industry promises important developments, while also petroleum was produced for the first time, 700 bbls. having been obtained as the result of a few months' test pumping. The first gold brick produced from Newfoundland ore was obtained from a sample lot of 23 tons, mined by the Goldenville Mining Company. This brick, however, was of very small value, still the result of the test shipment was regarded as very satisfactory.

During the year, about 2,375 persons were engaged in mining and quarrying on the island, the percentage of accidents. being 1.22 per cent., while the fatalities were .16 per cent. The following table shows the mineral productions for the year:—

Name of Product.	Quantity raised.	Manufactured or used in the country.	Value of Minerals exported.	Total value of production.
			$	$
Barite . . .	2,000 ts.*	.....	4,750	5,000
Brick	1,236,000 M.	1,236,000 M.	.....	11,432
Bldg. Stone	3,100 ts.	3,100 ts.	.....	4,650
Cobble and Spawls.	4,000 "	4,000 "	.....	2,000
Copper Ore.	107,839 "	.....	395,723	466,739
Gold.. . . .	11 ozs.	.....	.....	209
Granite. . .	1,945 ts.	1,945 ts.	.....	11,550
Iron Ore . .	589,739 "	.....	585,739	589,739
Petroleum .	700 bls.	300 bls.	.....	1,134
Pyrite.. . .	60,200 ts.	.....	210,700	210,700
Sand and Gravel. . .	2,320 "	2,320 ts.	.....	5,800
Slate. . . .	2,700 "	.....	37,800	37,800
Talc.	1,562 "	.....	7,000	7,000
Not Specified.	.....	.....	200	200
		Total..	$1,241,912	$1,353,953

*In every case the long ton of 2,240 lbs. is used.

From the above, it will be noted that the most valuable products of the Island are iron, copper, pyrite and slate. The increase in the production in iron was largely due to the larger tonnage produced by the Dominion Company, whose output was increased to the extent of 94,632 tons. The Nova Scotia Company's operation make a less satisfactory showing, owing to the fact that work is now confined chiefly to underground mining, and consequently operations are more tedious and expensive than formerly. It is stated, however, that the ore bodies increase in thickness and quality as the underground work proceeds. The demand for the Bell Island iron continues good, a large proportion of the output being marketed at Rotterdam, while, too, a market has been opened for it in the United States, and also in Scotland. The report states further that there are prospects of the deposits on the western portion of Bell Island, in the early future, where tests are to be made this year with diamond drills. The Nova Scotia Steel Co. last summer attempted to mine the Workington deposits on the north side of Conception Bay, but failed to find a sufficient quantity of ore to warrant the continuation of work. This is much regretted, as the ore is of a very superior quality, being an ideal character of hematite.

The chief production of copper ore was made by the Union Mine at Tilt Cove, which produced 73,082 tons of cupriferous pyrites, while 165 tons were taken from Pilley's Island. A small output of 280 tons was extracted from the new copper mine at St. Julien's, N.E. coast, 80 tons of which were a high grade chalco-pyrite. This property is held under option by a New York company. From the Terra Nova mine, Baie Verte, an output of 19,312 tons of cupriferous pyrites was marketed in the United States, and used in the manufacture of sulphuric acid, the copper contents being carefully extracted and saved. A large ore body at York Harbor, Bay of Islands, owned by the Humber Consolidated Mining & Mfg. Co., was actively developed during the year. This ore body is said to be 57 feet wide, and to contain an average of about 7 per cent. copper, besides appreciable gold and silver values. Some 15,000 tons of ore were raised, 8,200 tons being shipped to the United States.

In 1904 the output of pyrite far exceeded that of any previous year, 60,200 tons, valued at $210,700 having been mined. This ore is obtained principally from Pilley's Island, Baie Verte and Roswell's Harbor, Labrador. At this latter property a considerable amount of development work has lately been performed, while also the mine has been well equipped with machinery. The deposit is reported to be a large one, and high in sulphur, while also containing a small percentage of gold.

The production of the slate quarries shows a considerable falling off, this being attributed to the destruction by fire of the plant of the Wilton Grove quarry, while nothing was done with any of the slate properties at Trinity Bay.

Incorporated in this report is also an account of exploration and boring operations in the central carboniferous basin, near Grand Lake. The first discovery of coal in this region was made by the late J. B. Jukes, M.A., F.G.S., F.C.P.S., an eminent geologist, who visited the locality so far back as 1840. In 1865 the late Alex. Murray, C.M.G., F.G.S., explored that section between Hall's Bay and Bay St. George, and observed fragments of coal strewn along the shore near the head of Grand Lake. In the following year he ascended the Main Humber River, and ascertained that the carboniferous series spread over a vast extent of the Humber Valley, but only the lower and unproductive portion was met with. The compar-

atively low angle of inclination at which the strata dipped toward the southward, indicated that higher strata bringing in possible true coal measures, should be looked for in that direction. A later investigation on the part of Mr. Howley confirmed this conclusion. Boring operations were then commenced by the Government, but only negative results were obtained until 1891-2, when a more systematic plan was adopted under the direction of the geological staff. Under the foot-hills to the south of Grand Lake, some rock exposures were discovered, and upon stripping these, good sections were exposed, consisting of true coal measures doubled up in the form of a sharp, narrow synclinal trough, holding seams of coal of various thickness. Further attempts were made to find coal near the Lake Shore on Kelvin Brook, boring being carried on there without, however, great success, but in 1895, railway construction having reached the vicinity of the Grand Lake, coal was discovered near Goose Brook. The report says: "This find was a great step in advance, and afforded a clue to the true structure of the region. We now had hold of the coal basin again in a part of the country far removed from the hill range.....or just eleven miles on the strike from the further western extreme of the trough. It proved beyond question that the conclusion which had been arrived at as to the prolongation of the coal trough into the flat country was correct, and that the likelihood of the trough widening out in its western extension was very probable. Had this clue been followed up at the time we would now be in possession of much more information of this central coal basis, but the prosecution of the investigation was again deferred."

In 1898 the coal reserve was handed over to Messrs. Reid, who commenced mining operations on seams of coal at Aldery, Coal and Goose Brooks, and extracted some 8,000 tons of coal. After the reserve again reverted to the colony no further attempt was made to explore the region until last year, when the Government made an appropriation to continue the explorations with a Davis Calyx drill. Boring was commenced about half a mile east of Goose Brook, and two genuine coal seams, besides some smaller ones, were discovered. The result of the season's operation was to unmistakably indicate the existence of a larger and more promising trough of the coal measures, or rather extension of the original trough. Another important point ascertained was the fact that this portion of the coal trough is far removed from the hill range, and occupies the flat country, having, therefore, room to expand both laterally and longitudinally, over a very considerable area, nor is it so likely to be badly faulted. Mr. Howley states that he will not be surprised if, on fuller examination, this coal basis will be found to attain a thickness of measures not far short of the Sydney coal trough, which comprises between 1800 and 1900 feet; and in view of the importance of the possession of available coal on the island, and the effect it must inevitably produce on the future of the mining development of the colony, he strongly urges the Government to not only reserve this coal area, but, if possible, all the areas or prospective areas in which coal is likely to occur elsewhere in the country.

THE PRESENT PHASE OF THE CARIBOO HYDRAULIC.

Shareholders of the Consolidated Cariboo Hydraulic Mining Company, Ltd., of whom the majority are eastern men, are naturally much disappointed and disgusted at the present position of affairs; and the failure of this undertaking, which has always been regarded as one of the most promising in British Columbia, will, it is feared, further discourage the investment of Eastern Canadian capital in mining ventures in the western province. The worst feature of the case is the fact that the property is, undoubtedly, a valuable one, and under anything like favourable conditions is capable of yielding very handsome returns on a large capital. This, it may be said, is the opinion of every experienced engineer who has visited the ground. To what cause, then, it may be reasonably asked, can the present failure be ascribed?

While, of course, during the last few years, shortage of water, due to an abnormally scant precipitation, is very largely responsible for the relatively small recoveries made, the question, we fear, can only be really answered in one way, namely, that the directors, although repeatedly advised to do so, failed to appoint a competent person to control and regulate expenditure at the mine. Their reason for neglecting this precaution is tolerably well known to many, and there is no need here to dwell at length on the point. Meanwhile, for the last two or three years the mine has been operated at a considerable loss, and at the end of the 1903 season it became necessary for a large sum of money to be raised in order that the work might be continued. This was provided by a few of the principal shareholders who agreed to advance the company, on a short loan, the sum of $170,000, without interest. Later at a meeting of shareholders, held on January 13th, of that year, shareholders were invited to participate *pro rata* in subscribing to bonds for $400,000 at 50 per cent. of their face value, to pay off the liabilities and provide additional working capital. But this invitation met with practically no response, barely 60,000 bonds yielding but $30,000 being subscribed for. Consequently, each of the shareholders concerned in the $170,000 advance, was compelled to accept bonds for the amount of his respective advance, no interest being charged. In 1904 these few gentlemen were also called upon to guarantee bank loans for wages, plant, development, etc., pending the season's clean-up. The returns were again unsatisfactory, and guarantors were faced with a deficit of $70,000. Under these circumstances they, very naturally, refused to do more this year unless supported by the shareholders in general, and a circular was issued to this effect, stating that unless the holders of the company's stocks were prepared to do their share towards saving the property, the trustee for the bondholders would sell the mine under the terms of the mortgage indenture securing the bondholders, none of the coupons having been met up to the time of the issuance of this circular, in March last. It was further stated that a majority, if not all, of the bondholders, who are also shareholders in the company, would join *pro rata* with the other shareholders in providing a fund sufficient to liquidate the bonds on the basis of the price at which they were sold, without interest, and by

these means pay off the present debts of the company and secure the additional water supply of 2,500 miners' inches at the mine, which, according to the manager's estimate, would cost about $250,000, the total requirements being thus, approximately, $520,000. If this proposal had been carried out, the shareholders would have been required to contribute an equivalent of 65c per share. The proposal, which was an eminently reasonable one, was considered at a meeting of shareholders held on the 3rd of April, but, shareholders, failing to evince any disposition towards adopting this plan for the conservation of their interests, the directors issued another circular on May 8th, stating that, under power of sale, contained in the mortgage deeds, the trustee for the bondholders would immediately exercise his right to sell the property either by public sale or by private arrangement. There the matter now stands. In a measure one feels that shareholders are deserving of sympathy in consequence of the considerable loss which some of them must sustain. A good many holders of stock have held their shares for several years trusting to the repeated assurances given them by the manager that large profits could not be long delayed. That the manager, however, was quite honest in his optimistic view of matters, goes without saying, and as he, too, is a large shareholder, his loss is not only a financial one, but he must necessarily experience keen disappointment as a professional man of, by the way, unquestionable attainments, in the non-fulfilment of his hopes. On the other hand, the few shareholders who have practically financed the undertaking from its inception, and now stand in the position of bondholders, are likely, if they decide to purchase the property among themselves, to reap a rich reward, for no one doubts that the mine is capable of being profitably operated once present disabilities are overcome.

Referring to the consolidation of mining interests at Rossland, a correspondent writes:—

"Were that amalgamation to be confined to the War Eagle, Centre Star and Trail smelter it would simply mean, of course, that the mines would gain reduction works. But, in that event, would the Trail smelter obtain from these two mines, alone, sufficient ore to keep the furnaces running. And if smelting is not done upon a large scale there can be no substantial reduction of costs. It is not that the mines considered have not sufficient ore blocked out to supply the smelter, but it is that the shafts on the War Eagle and Centre Star could not handle a much larger tonnage than they have done in the past. The shaft on either property has three compartments. One is used as a manway and for the pipes. The other two have to be used for the introduction of timber, of steel and of labour as well as for the hoisting of ore. Moreover, the hoisting engine in either case has not a much greater capacity than that at which it has been used. Hence the tonnage is not likely to be enough to fill the smelter requirements. To alter this condition of affairs the shaft would have to be enlarged and, furthermore, the engines replaced. This would mean a great expense to shareholders. But if the amalgamation is also to include the Le Roi, the Trail smelter is at once assured of an ample supply of ore; for not only has that mine a large reserve but it has a five compartment shaft which is so arranged that a very large quantity of ore may be hoisted continuously. Moreover, as the Le Roi and the other mines considered are contiguous, some comparatively inexpensive alterations would permit of the Centre Star ore, at least, being hoisted through the Le Roi shaft. This would save money to the Gooderham properties and at the same time would ensure the Le Roi a cheaper rate of smelting. Beyond, however, the mere question of bulk, important enough, there is the other smelting problem, that of flux, which must be considered. Now the ores of the War Eagle, Centre Star and Le Roi are almost identical. Moreover, they are all siliceous ores The Snowshoe has been mentioned as a fluxing ore, but this has been nowhere authoritatively stated. *Au contraire*, the Snowshoe is itself so siliceous an ore as to itself require flux to overcome this. Hence it would be of little avail to the smelter. The ideal amalgamation would be with properties, such as the Kootenay, the Le Roi No. 2 and the Velvet, all in Rossland camp, which contain copper and iron. The amalgamation idea has ever been a favourite with the chief owners of the War Eagle. Centre Star, at a time even when the Le Roi meant also the Le Roi No. 2 and the Kootenay. But with the utter failure of the Kirby concentrator it has seemed the only possible way out of the slough of despond into which these properties have been plunged. But concentration is not everywhere the failure in Rossland camp as it proved with the Trail plant. The Velvet certainly so far has been most successful and the Le Roi claims almost as good result with its experimental works."

The energetic character of the new Minister of the Interior, the Hon. Frank Oliver, is well known, and it may be quite certain that he will lose no time or opportunity in making the departments over which he has direction as efficient and useful as it is possible for them to be. We may, therefore, expect that the vacancy, created by the lamented death of the late Dr. G. W. Dawson, as Director of the Geological Survey, will be very shortly filled. Immediately after Dr. Dawson's death, the Canadian Mining Institute made certain recommendations to the Hon. the Minister of the Interior, in connection with the re-organization of the Survey, the department being specially urged at that time to appoint Dr. Frank D. Adams, Prof. of Geology at McGill University, Montreal, as successor to Dr. Dawson. Circumstances, since this recommendation was made, have in no sense changed; in fact, it is of the utmost importance and urgency that a director should now be appointed to re-organize the Survey and relieve the Minister (who is politically responsible) from the necessity of attending to the details of its administration. We believe we are perfectly correct in stating that the appointment of Dr. Adams to this important post would be, not only acceptable to the present staff of the Survey, but it would be extremely popular with the mining communities of Canada. It is unnecessary to refer to Dr. Adams' capabilities, for these are sufficiently well known. It may, however, be added that he possesses in an eminent degree, in addition to his executive and technical qualifications, the rarer accomplishments of tact and judgment. Consequently, he should make no unworthy successor, to even the late Dr. G. M. Dawson.

Mining men in British Columbia are complaining bitterly of the state of the mineral law regarding title to claims which are not Crown granted. Several adverse actions have been tried lately and the uncertainty with this class of claims is very great. The particular point over which trouble is arising is the practice of allowing fifteen days between the location of a mineral claim and the recording thereof. This was enacted for the purpose of giving the prospector ample time to record his claim, when situated in some more or less inaccessible district. But if the claim were not recorded within the fifteen days given it apparently makes no difference to the fact that no other claim may be located over the same, or portion of the same, ground during that period. It is, however, quite possible in the heavily timbered mountains in the Kootenay for a locator to fail to discover that a prior location has been made. Hence, as in a case recently tried in the Kootenay, a miner may locate and carry on his assessment work for five years and then apply for a Crown grant only to be adversed on the ground that within 15 days antecedent to the day on which he first located there was subsisting a mineral claim which had never been recorded but which had been located. The adverse party "jumps" the claim and then produces some prospector who is willing to swear that he located a claim which he never recorded within 15 days prior to the time of location of the man who is applying for a certificate of improvements. This difficulty might be readily overcome if the law were interpreted or altered so as to read that a claim not recorded within 15 days of its location could not invalidate the location of any other claim made and recorded within that period. As it is, mining men say that it is impossible to effect sales with the mining law in its present state of uncertainty as regards title to non-Crown granted properties.

It is not the fault of the present editor that Mr. J. E. Hardman's valuable paper, "On the Examination and Valuation of Mines," read before the Canadian Society of Civil Engineers so long ago as November, 1903, was not reprinted in the REVIEW ere this; and we cannot avoid expressing the view that our predecessor in ignoring the contribution of so well-known a Canadian mining engineer on a subject of such general interest, acted in a culpable manner. However, to follow out the adage of "Better late than never," we commence in this issue the publication of the paper in serial form—shall we say with the commendable intention of rescuing it from the oblivion with which it is threatened, (from, of course, only the point of view of mining men) if it is allowed to remain hidden away among the Transactions of the Canadian Society of Civil Engineers? But, seriously, it is a matter of regret that the paper was not reprinted by the technical press at an earlier date, for it was written just about the time, or rather strictly speaking before, a very interesting discussion on the proper interpretation of such phrases as "ore in sight," and other matters incidental to the examination and valuation of mines, provoked by Mr. T. A.Rickard, appeared in the columns of the *Engineering and Mining Journal*, and the time was then exceptionally opportune for Mr. Hardman's views to receive a wider publicity. Nevertheless, the subject is one which can stand much and frequent discussion, and in this case the matter is dealt with in a particularly able and common-sense manner.

Prior to the last elections in Ontario, the Hon. Mr. Whitney undertook to create a Department of Mines in that Province, and to appoint a man from Northern Ontario, familiar with the conditions existing there, to fill this important cabinet position. It proved, however, difficult to disassociate governmental business appertaining to mining lands and affairs from other matters coming within the province of the Department of Crown Lands. In consequence, therefore, the new portfolio of Lands and Mines was created, and Mr. F. Cochrane, who has for many years resided in New Ontario, and is, therefore, thoroughly conversant with the timbering, mining and other interests, and also has a special knowledge of affairs connected with the settlement of new districts, was recently offered the administration of this department. Mr. Cochrane accepted the office, and was duly elected by his constituency. The new Minister is known to be a man of excellent business judgment, possessing too, in an eminent degree the qualities of fairmindedness and firmness of purpose. He may, therefore, be depended upon to do all that is possible for the advancement of the interests of the northern sections of the province, in which mining developments will, no doubt prove an important factor.

Mr. J. Obalski, who is one of Canada's representatives at "L'Exposition Universelle et Internationale," at Liege, sends us an interesting account of the Canadian exhibits. Mr. Obalski states that: "The Canadian Pavilion is attracting much attention, the mineral exhibit being considered especially good. The collection is essentially an industrial one, demonstrating, as was the case at St. Louis, our resources in raw material. We show asbestos, mica, nickel, corundum, gold, silver and cobalt ores, while the British Columbian display is one of the principal features of the exhibit. The Canadian Pavilion was officially opened on the third of June, the opening being well attended by Ministers and other high officials."

It is, perhaps, none the less gratifying that the Dominion should be well represented at this important exposition in respect to her mineral wealth, when it is learned that no other country has, seemingly, devoted the same attention towards getting together representative mineral collections. In another direction, however, we do not make so good a showing, as no arrangements have been made for the representation of Canada officially at the International Congress of Mining and Metallurgy, which is to meet at the end of the present month.

One notes with satisfaction the steady growth and progress of mining developments in Ontario. That province, like British Columbia, has suffered at the hands of the unscrupulous promoter, but fortunately to a lesser degree. There has never been as extensive a mining "boom" in Ontario as was the

case in "B. C.", and there is much to be thankful for in that. On the other hand, while British Columbia claims, with reason, in point of tonnage yield and values to be the mineral province of the Dominion, Ontario may well argue, that judged from the standard which is, after all, to the capitalist, the more convincing one, that of dividend-earning capabilities, she still has relatively the advantage of her western competitor. In addition to these established and profit-earning mines, properties, in some cases, of exceptional promise are now opened up in new districts, and it is no longer so difficult to find either Canadian or American capital for the development of them. It is probable that some important developments will take place this year in the Temiskaming region of Ontario, as well as the adjacent territory extending into the Province of Quebec.

THE MILL BUILDINGS AT THE ASBESTOS AND ASBESTIC COMPANY'S PROPERTY, DANVILLE, QUE.

ASBESTOS MINING AT QUEBEC.

Among our illustrations this month are reproductions from three recent photographs of the works and plant of the Asbestos and Asbestic Company, Ltd., operating at Danville, Que., which has lately made some important additions to its plant. The Company's quarries and fibreizing plant are situated about three miles southeast of Danville, with which point communication is established by the Asbesto & Danville Railway. The quarries were first opened in 1879, and are situated on a ridge of serpentine rock covering an area of nearly 100 acres. The asbestos is found in veins from one-eighth inch to two or three inches, which occur throughout the whole mass of serpentine. The fibre in each vein is absolutely pure, and its quality very fine and uniform. The rock is quarried and hoisted from the pits by means of cable derricks. The longest veins, however, are "cobbed" or hand-picked, the balance of the rock containing the shorter veins being conveyed to the crushers, from which it passes to the separating and fibreizing machinery, the finely ground refuse being shipped for wall-plastering purposes. The fibreizing plant consists of two separate mills, the new and larger mills having been completed in 1902, and this contains all the latest and improved machinery for fibreizing asbestos. The quarry is fully equipped with a Rand air compressor, cableway hoists, rock drills, etc. Last year the company employed a force of about 300 men, and produced a considerable quantity of asbestos and asbestic, which was shipped. The equipment of the mine was increased by the addition of three derricks.

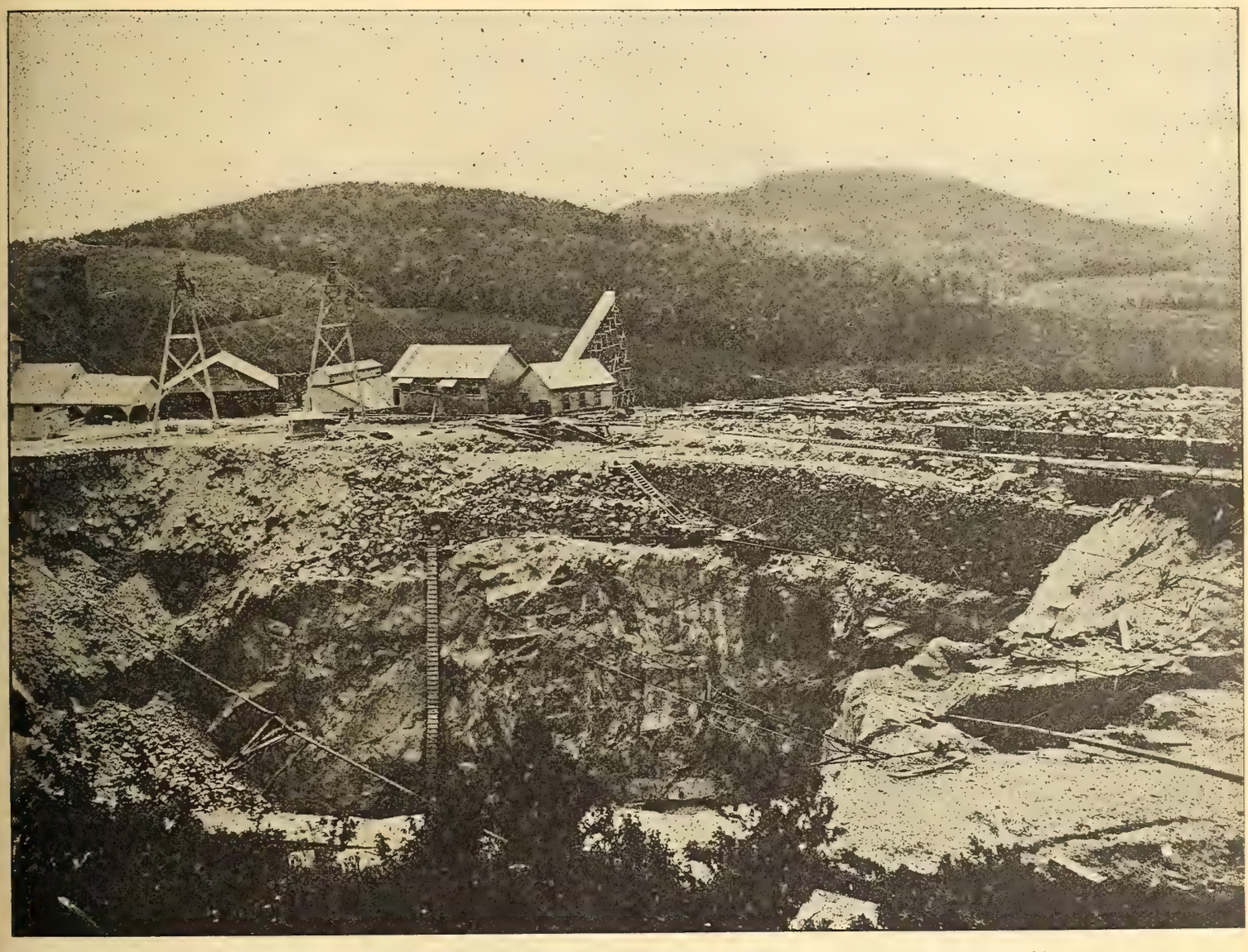
"RARE MINERALS" IN CANADA.

(Specially contributed.)

It is reported on good authority that the Maisonneuve Mica Mine in the Township of Maisonneuve, county of Berthier, has been sold to Paris capitalists, and that operations have commenced on that property with a view to search for, and mine the rarer minerals containing amongst others, as established by previous thorough investigations, the new mineral radium. This property is situated about 40 miles from St. Emily Station, on the C. P. R., and has been worked in former years for white mica, which is said to be of excellent quality. This mineral occurs in a remarkable powerful vein of pegmatite near a creek, varies from 30 to 50 feet in thickness, and is abundantly charged with muscovite mica crystals, many of which yield sheets of merchantable size and quality. The vein, which runs east and west, cuts the gneiss formation under an angle of 40 degrees, the dip being perpendicular, and is exposed by stripping for a distance of 300 feet. While the rock on either side, and in contact with it and throughout the country generally, is a comparatively fine grained aggregate of quartz, feldspar and hornblende with scaly portions of mica arranged in parallel layers, and no constituent predominating in any layer to the exclusion of the others, the vein matrix, on the other hand, consists of large and coarse crystalline masses of pure quartz, and flesh-coloured, or orthoclase feldspar, confusedly aggregated together, but perfectly distinct from, and frequently appearing to penetrate each other with straight radiating clavage faces for a considerable length. The white muscovite mica occurs in this vein partly in isolated crystals distributed irregularly over the whole width, and partly in accumulations near the contact with the adjacent formation. Most of the crystals obtained from the mine deliver fine sheets cutting from 2 x 3 up to 3 x 7 inches and some crystals in situ measured 18 inches square. This pegmatite vein is distinguished by the occurrence of foreign minerals. Tourmaline, beryl and garnets and the rare mineral Samarskite or uranotantalite occur somewhat abundantly in the excavation made in the vein. An analysis of Samarskite found on this property, according to Dr. Hoffman (Report Geological Survey, 1881-82), gave

Oxide of uranium	10.75 per cent.
Oxide of yttrium	14.34 per cent.
Oxide of cerium and thorium	4.78 per cent.

Samples of these rarer minerals obtained from this property were also recently forwarded to Paris and an analysis revealed the existence of radium. Operations have now begun on the property with a view to principally search for and mine the rarer minerals and according to advices received, it is likely that the property may prove a valuable source for radium.



VIEW SHOWING A SECTION OF THE ASBESTOS AND ASBESTIC COMPANY'S QUARRIES. (See page 126.)

In this connection it may be mentioned that nearly all pegmatite dikes in the Laurentian formation of Canada contain rare minerals in a more or less degree, and it appears as if here offers itself an extensive field for study and research work. Mr. Obalski in a paper read before the Canadian Mining Institute at the Toronto meeting in March, 1904, pointed out that he had found a mineral which he identified as cleveite and which, on further investigation, showed to contain 70.71 per cent. uranium oxide, while its radio activity was pronounced to be very strong. Prof. Rutherford, of McGill University, made an analysis of this sample and discovered that it contained one-tenth of a milligram of radium. This makes it comparable with the best pitchblende so far tested for the production of radium. The pegmatite dike from which this mineral was taken is about 18 miles back from Murray Bay in the County of Charlevoix on the north shore of the St. Lawrence River.

The Villeneuve mine, at one time famous for its production of an excellent quality of white transparent mica, and situated in the north of Buckingham in the County of Ottawa is another example for the occurrence of rare minerals. The mica occurs here in a dike of pegmatite composed largely of clean white feldspar and quartz, in a width of about 150 feet, cutting nearly along the strike of a reddish and grey quartzose gneiss formation. A sample of uranite taken from this mine has been analyzed by the United States Geological Survey and contained the following:

Oxide of uranium	37.7 per cent.
Oxide of yttrium	2.57 per cent.
Oxide of cerium and thorium	6.81 per cent.

Whether this mineral contains radium has not been determined yet, but as the composition is similar to that found in Charlevoix and since the uranium earths are recognized as bearing generally radium, there is a strong possibility that such might be the case.

ANOTHER VIEW OF THE QUARRIES. (See page 126.)

The distribution of pegmatite dikes in Canada is very large and if investigations in the direction as above indicated were made, there is no question that many a deposit now lying dormant, may be found to contain these rarer minerals in quantities to warrant their exploitation. The largest pegmatite dikes so far discovered are those in the Saguenay district, which is situated at the lower St. Lawrence River below Quebec. Besides these there are a number of pegmatite veins in the north of Ottawa, in the vicinity of Mattawa, at several places in Ontario and also in British Columbia.

On the left side of the Saguenay River a number of coarse pegmatite dikes occur, cutting a dioritic gneiss. This region is not surveyed or explored, but since 1891 constant discover-

ies have been made, some of them proving to be of very large extent, especially those found in the township of Bergesonnes, Tadoussac and Escoumains.

In the Bergeronne district we have the McGie mine, situated at a distance of 12 miles from Lake des Escoumains. This vein according to Mr. Obalski's examination runs N.E. for a length of a ¼ of a mile, cutting the dioritic gneiss strata. The width is from 15 to 25 feet in the southern part, where the same has been worked for a length of over 140 feet for mica.

In the northern extension the pegmatite dike measures 75 feet in width.

Tourmaline, and garnet, beryl, and also muscovite mica has been found in small quantities.

Another property of importance is the Beaver Lake property, known as the Hall Mica Mines. It is situated at the head of the little Bergeronnes River, in close proximity to Sable Lake, about 11 miles from the St. Lawrence River. The width of the pegmatite dike is reported to be between 200 and 300 feet, with a vertical dip and a course north-east.

Besides the above described occurrences there are a great number of smaller discoveries. Several pegmatite dikes have been reported in the country north from the McGie mine, at the heads of the river Beaulieu and Bas de Soie.

Along the banks of the Canard River, near the St. Lawrence, we can notice a large number of pegmatite veins, but so far no investigations have been made as to their contents in the rarer minerals.

In the country north of Ottawa in the townships of Wakefield, Templeton and Low, a large number of pegmatite dikes have been found and some of them worked for muscovite mica, but no information is available—excepting the Villeneuve mine as regards their carrying rare minerals.

In the township of Aylwin, ½ mile north of Venosta station, a vein of pegmatite cuts through a greyish garnetiferous gneiss.

In the Parry Sound district, in the township of Proudfoot, a coarse and fine grained gneiss occurs, containing ciotite and muscovite mica. Various masses of fine grained diorite penetrate the gneiss and a great number of pegmatite dikes.

THE NEW QUARTERS OF THE CANADIAN MINING INSTITUTE—THE READING ROOM.

In British Columbia, some large pegmatite dikes have been opened up for mica in the vicinity of Tete Jaune Cache, about 150 miles northwest of Donald on the C. P. R. According to Mr. McEvoy, the pegmatite veins cut the country rock, which consists in that locality of garnetiferous mica schists with some blackish mica schists and light colored gneisses that resemble foliated granitaid rock, the garnet mica schists being the predominating rock. The pegmatite vein has a width of 18 feet, is copiously charged with mica crystals but no investigations have yet been made as regards the occurrence of rare minerals.

THE NEW QUARTERS OF THE CANADIAN MINING INSTITUTE.

Reference was made in our issue of last month to the removal of the Canadian Mining Institute's Library to the building of the Canadian Society of Civil Engineers, No. 877 Dorchester Street, Montreal. In order to give those members of the Institute who are also readers of the REVIEW the opportunity of forming an idea of the new quarters, a set of photographs has been specially taken for reproduction in this issue, showing views of the reading and smoking rooms, the lecture hall and the secretary's office.

THE NEW QUARTERS OF THE CANADIAN MINING INSTITUTE—THE SECRETARY'S OFFICE AND LIBRARY.

HYDRAULIC MINING CONDITIONS IN THE ATLIN DISTRICT OF B.C.

(Extract from a report by the Provincial Mineralogist.)

Before a deposit can be said to be gold-bearing commercially, the conditions surrounding such deposit must be taken into account. In hydraulic mining, for example, the conditions are:—

1st. The quantity of gold per cubic yard in the dirt required to be moved, and the form in which it occurs.

2nd. The quantity and availability of water, etc.

3rd. The character of the deposit and its amenability to the hydraulic stream, the grade of the bedrock, the quantity of boulders, etc.

4th. The possibility of a dump for tailings.

All of these conditions are necessary to success, though the importance of any one condition diminishes in proportion to the excellence of the other conditions. The point might be similarly illustrated regarding both individual placer mining and dredging. Locations are supposedly made only when there is at least a present prospect of their being commercially workable, not only as to the sufficient presence of gold, but as to the surrounding conditions. Since "conditions" change as the country opens up, as labor and supplies can be had cheaper, and as cost-saving devices are introduced and improved, we may look in the future to possible further extension of the goldfield than the locations at present recorded would seem to indicate.

The lapse of four years which had taken place since the writer's previous visit to the camp rendered to him noticeable the changes which had taken place in that time, possibly more so than they would be to residents, to whom such things have been a gradual transition. Probably the most encouraging fact noted of the camp is the maintenance during these years of the output, which still continues to be made from the same creeks and from within the same area as in 1900. Then, the gold was taken almost entirely from the beds of the modern creeks, and as their extent was limited, their exhaustion seemed to be within a measurable limit of time. Now, these creek beds have ceased to be an important factor in the pro-

duction, except where worked by a company. Such concerted effort seems to have rendered workable further and deeper reaches of the creek bottoms than was formerly anticipated, and this promises to continue, through the introduction of mechanical power for handling the dirt or overburden.

Then, the benches and the "old yellow deposit," though they were known to be gold-bearing and their importance was recognized, were still undetermined quantities. The benches have been worked back by hand for a certain distance from the creek, and as this distance, with the increasing overburden, became too great, hydraulic methods were introduced, which, having emerged from the experimental stage, now give definite promise of success.

The "old yellow deposit" had been definitely determined in only a few places, and only near the "outcrops," so to speak, although the writer considered it safe at that time to say that "indications are that it extends for some distance into the "bench claims," and these indications have been proved correct by numerous drifts from the creek valleys and, in its deeper portions, by shafts with drifts therefrom.

Then, a placer claim was workable only when, during the short summer season, it would supply the miner with his necessities for the whole year. Now, these "drifting propositions" provide winter work for men, enabling them to work in summer placer claims yielding a smaller return than was formerly necessary.

And the end is not yet, as far as this "old channel" is concerned, for its limits have not as yet been defined. That it is much greater than was formerly even suspected is certain,—and it is almost certain that for years to come it will continue to be mined and to produce gold.

THE NEW QUARTERS OF THE CANADIAN MINING INSTITUTE—THE SMOKING ROOM.

From the nature of drift mining, it does not here promise large enterprise or great individual profit, the gold therein being very uniformly distributed, and in amount only such as to pay good wages for the labor expended. This means for the camp a long, steady existence, since the greater part of the "old channel" is under so great an overburden as to be workable only by drifting.

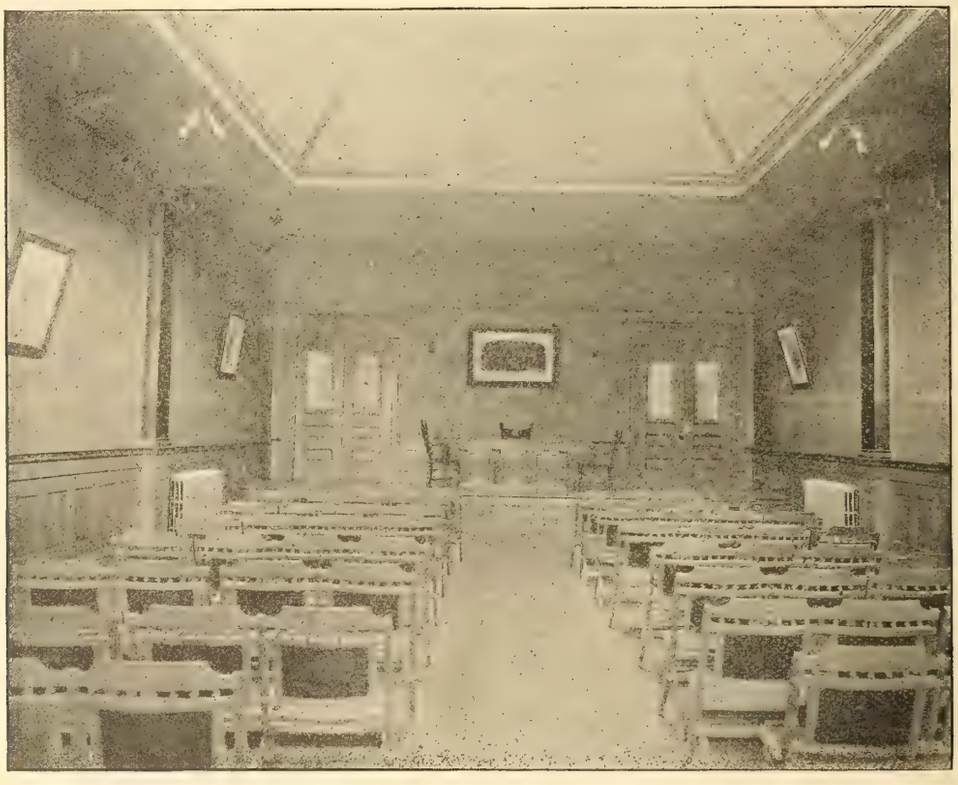
Where the deposit occurs along the valley of the present stream, as on lower Pine and Spruce creeks, and where it has

been cut by these streams, it is being attacked from the valley by hydraulic methods.

Since the previous visit of the writer, the development of the camp has rendered clear many points which were previously little more than indications, and as such were given in the Report of 1900. The conclusions then arrived at have been almost exactly borne out by the subsequent work; the area of the field remains the same; the evidence is strengthened that Pine and Spruce creeks at one time joined about Etephendyke and then debouched to the north, towards Trond gulch, emptying into a lake which then covered all the flats at the Half-way house, and that the present course of these below this point is of more recent cutting. The "old yellow channel" has developed along the lines then indicated, but to an extent not then hoped for.

In 1900 the Provincial Mineralogist attempted to ascertain the direction of flow of this yellow dirt, by taking levels at rounded or flat water-worn form and faces of the gravel, and, above all, by the "chingling" of the flatter stones in the deposit, while the gold is usually on bedrock or in some defined stratum.

All of such evidence of flow is lacking in the old "yellow deposit of Atlin, and while some of the boulders are large and rounded, many are angular, the flat ones often standing on edge, as though so dropped into mud in still water. The greater part of the deposit consists of granite fragments, now almost decomposed, with resultant clay (kaolin) and grains of silica. While the gold here is found for the most part near bedrock, though not necessarily on it, is occurs some height above—more or less throughout the deposit. The characteristics of the deposit did not seem to admit of its having been caused directly from glaciers. The evidence is such as to force the conviction that this deposit was not formed in rapidly running water, but that it was dropped in comparatively still water on a bottom (bedrock) such as that of a lake or sea, with a slope, but not a channel. As to exactly how the dirt was deposited, there is room for various theories, but the most probable seems to be that glaciers, carying in their bases the dirt, slid into a sea or lake and, driven by wind or current into this bay, there melted, the dirt dropping to the bottom, fradually forming the deposit in question.



THE NEW QUARTERS OF THE CANADIAN MINING INSTITUTE—THE LECTURE HALL.

various points, and while these levels were not conclusive, they indicated a flow, which subsequent work has confirmed, giving a grade to the deposit confroming in direction to the flow of Pine and Spruce creeks, but it is so slight (being between 1 and 2 per cent.) that it is difficult to believe that the heavy material in the deposit would be carried by a current produced by such a grade; and further, the workings of the hydraulic pits, etc., notably that of the North Columbia Co., on Pine creek, expose a face in which the heavy boulders and angular fragments are so deposited together as to render it extremely improbable that this deposit is an "old channel," in the usual meaning of that term: viz., the bed of an ancient stream.

In Cariboo, and elsewhere in British Columbia, where the placer deposits occur, the "old channels" contain in themselves the evidence of the direction of their flow; and this is shown by the more or less uniform size of their constiuents, by the

This is further borne out by the fact, reported by the Superintendents, that in the Deeks pit, on Pine creek, during the hydraulic working, a layer of seashells was found in and near the top of the yellow dirt. This layer was very local, and did not extend to the adjoining pits, and was, unfortunately, all washed away before the Provincial Mineralogist visited the camp.

It is not very clear where these glaciers were formed, as certainly no quartz has been found in the vicinity which would justify the belief that it is the *madre de aro.*

ON THE EXAMINATION AND VALUATION OF MINES.*

By JOHN E. HARDMAN, S.B., MA.E., etc.

The writer has been asked to contribute to the proceedings of this new section of the Society a paper which embodies the approved practice for the examination and valuation of mining properties, and which shall have, if possible, special reference to the difficulties, or advantages, which Canadian deposits present.

In attempting to comply with this request, he desires to disclaim, at the outset, any originality for what follows; the methods in use are common to all engineers of good standing, and afford little chance for original treatment excepting in minor details, which always present themselves with each new deposit examined. Nor, in his experience, can he state that the deposits of this country present such variations from deposits in other countries as to entitle them to separate treatment. No two ore deposits are exactly alike, and no one hard and fast scheme of treatment is applicable to all. Mineral deposits may be likened to patients in a hospital ward; all of these patients may be troubled with the same disease, but the individual temperament and peculiarities of each one require variations of the standard treatment of such disease. So, also, in the case of mineral deposits, each deposit requires variations in the particular treatment employed for its examination. By reason of this variation, perhaps because of it, examining engineers may differ in their opinions and estimates; but the practical experience, varied knowledge, natural caution, power of discrimination, and of divination—in short, the personal equation—of the engineer are what give value to his report, and differentiate it from the majority of similar reports. Any man may learn to correctly sample an ore deposit or to assay such samples, but few men are given the combined natural capacity, varied experience and sound judgment which render their opinions on mineral deposits of exceptional commercial value.

Ten or fifteen years ago there was little, if any, literature on the matter of mine examinations, and the principle of valuation was applied (with few exceptions) to deposits of coal or iron, and then, chiefly, to properties in England. The work of Hoskold† for a long time stood alone in literature as an attempt to treat the subject of valuation in a scientific manner. But within the last five or six years the proceedings of scientific societies, and the columns of the technical press, have contained a multitude of both carefully and carelessly written articles, which have exhibited the views and methods of mining engineers upon the subjects of sampling and measurement, and of examination generally, and which, by the very interesting and educating discussions that have been aroused, have fairly covered the ground and given a solid basis on which a permanent growth may be expected. The writer wishes to acknowledge here his indebtedness to all this literature.‡

No attempt will be made in the following paper to give any rigid scheme for the guidance of engineers engaged in mining practice, since the writer knows too well the futility of such rigidity. No set of rules can be made to cover the proper examination and valuation of *all* mines, for nature has never made two deposits precisely in the same mould, or under the same geological or geognostical conditions. The following outlines of what are considered necessary and essential points, are only presented as approximating the best practice of the present day.

Definitions.

As this paper is intended to deal with mines only, it is proper and necessary to furnish a clear definition of what is meant by the word "mine." The origin of a mineral, the uses to which it may be put, or the manner of working it, are not of definite value; for many valuable deposits of iron, mica, asbestos, coal, copper and other minerals are worked by open cuts, or by quarrying. It is especially important, here in Canada, that distinction also be made between "mines" and "prospects," for "so long as unexplored bodies of mineral are termed mines, just so long will discredit attach to the mining business." The difference between a mine and a prospect is the difference between what is *known* and what is *surmised*, or unknown.

As used in this paper, the word "mine" means that portion of a commercially valuable mineral deposit which has been opened, explored and blocked out by underground workings, such as shafts or inclines, tunnels, drifts, raises, winzes and the like; if a deposit of valuable mineral has not been thus opened and blocked out, it is a "prospect" and no scientific valuation of it is possible.

Most of the mineral deposits now working have certain portions which have been blocked out, and other portions which have not, and therefore under the definition given, are a combination of a mine and a prospect. Out of this combination has arisen the need of further definitions applicable to those portions which have been partially, but not wholly, blocked out. For many years the phrase, "ore in sight," was used indiscriminately, both by good and poor engineers, to designate those portions of a deposit which were either fully or partially blocked out, or both. But, about 1900, Mr. J. D. Kendall* called attention to the very lax character of the phrase, and its abuse. After a full discussion by the Institution of Mining and Metallurgy, and portions of the technical press, the phrase has been substituted by the following terms:

"Positive Ore," by which is meant only such ore as is contained in those portions of the deposit which have been opened in such a manner as to permit measurement and sampling to take place around the entire perimeter of the block.

By "Probable Ore" is meant such portions of the deposit as have been partially blocked out so as to permit of measurement and sampling on *not less* than two adjacent sides.

There is still a disagreement, or hesitancy, as to the adoption of the third term proposed, "Possible Ore," which has been suggested by some engineers as applicable and permissable to ore exposed on one side only—when, from the history of the deposit, and from such credible evidence as is obtainable, there is a very strong presumption that the ore will extend and exist beyond the proved portions of the deposit.

Prospects.

In all countries the engineer may find, on his arrival at his destination, that what has been represented as a *mine* cannot be so classified, and that he has to deal with a *prospect* only. Manifestly, in such a case, no attempt at valuation would be of any worth, the engineer at best can only endeavor to ascertain what measure of probability the prospect has of eventu-

* A paper read before the Canadian Society of Civil Engineers, November, 1903.

† "The Engineer's Valuing Assistant." H. L. Hoskold, London, 1877.

‡ See "Discussions on Sampling," "Mine Examinations," and kindred papers in the *Engineering and Mining Journal*, 1900-1903; Transactions Institution of Mining and Metallurgy, Vols. III-X; etc., etc. See Bibliography at end of this paper.

* Institution of Mining and Metallurgy, Vol. X, p. 143, *et seq.*

ally becoming a mine. His report should clearly state this limitation, and should present all the facts which he is able to ascertain, but may contain the opinion which he personally deduces from these facts. Herein again comes in the value of the "personal equation" of the examining engineer; and an experienced man frequently "divines" the possibilities of a "prospect," where the tyro or prospector would not.

No more puzzling or indeterminate work can be given to the ordinary engineer than a commission to examine a prospect in an entirely new field. That engineers themselves differ in such cases is well known, one need only remember the disfavor with which the South African fields were regarded in the Eighties by many of the profession, and contrast it with the sentiment of to-day. Perhaps, likewise, the pyrrhotite deposits of Southern Kootenay, through concentration methods, will eventually redeem themselves, since their prospects to-day are certainly brighter than ever before. On the other hand (and much more frequently) a short, even cursory, examination will convince the engineer that the prospect has no possible hope of ever being more than a prospect. To take one illustration from the writer's own practice: Some Boston clients in search of pyrite suitable for acid-burning heard of supposedly large deposits of the mineral in Ontario, and were advised that some 35,000 tons were ready for shipment; the deposit was stated to be 30 feet in thickness and to average 48 per cent. of sulphur.

The writer was sent up to verify these statements and value the property. The first glance on my arrival showed that there were not even 1,000 tons of excavated material; half an hour told me that there were not 100 tons of saleable material in the whole amount excavated, and one short day's work in examining the excavations and looking into the character and geology of the deposit, showed the unreliability of the information, and the improbability of ever finding a sufficiently large body of mineral to render the property of commercial value.

This example has been mentioned purely as an illustration of the many vexing commissions coming to the engineer through good clients who have no means of knowing that the information on which they are acting is absolutely unreliable.

Canada is comparatively young in the mining world, but she has learned rapidly, and one of the facts she has obtained at high cost is, that it is cheaper to have a reliable professional opinion than to buy from boomsters.

Examination.

An examination of a mine is usually undertaken for one of two specific purposes, either to inform the owners on some point or points upon which information (other than that supplied by the manager) is desired; or, more commonly, to enable an engineer to value it, either for the seller or a possible purchaser; this valuation may include both the *actual* present value, and the *probable* future value.

The examination for information of the owners is usually directed to some specific point or points, such as the continuation of ore bodies, recovery of faulted or dislocated ore shoots, efficiency of present processes, economy of operation, etc., and, as a rule, is offered to engineers who are specialists in the particular line, or points, upon which the information is sought. The vaster number of examinations are required by possible purchasers who wish to obtain a reliable and unprejudiced opinion as to the present value of the mine, and its appurtenances, and as to the continuance of such value.

An examination of a mine comprises a careful and systematic inquiry into the nature and character of the ore deposit, including both the geology of the deposit itself and that of the surrounding district; it involves a study of the methods which may already have been adopted for the extraction and marketing of the ore, and the critical consideration of whether such methods are the best and most economical; it requires the determination, by the most accurate methods applicable, of the extent and value of the ore which is exposed and measurable in the workings, and a close, conservative approximation of the amount and value of such ore as is not *measurable,* but is *reasonably probable;* it necessitates an appraisement, on a business basis of the existing facilities and appliances for extracting the payable ore, as well as a reliable estimate of the amount of money needed to secure an increase of output, an improvement of the product, and a diminution of the cost of extraction. In short, such an examination comprises an inquiry into all subjects that have a bearing upon the correct solution of, or answer to, the following questions:

(1) What will be the cost of extracting and marketing this ore?

(2) What is the average value of the ore in this mine?

(3) What is the tonnage, or amount, of payable ore actually measurable in this mine? And what additional amount, not measurable, is reasonably probable?

When the above questions have been answered, one can proceed to the determination of the second portion of the enquiry, which relates to the valuation, and which involves correct answers to these additional questions:

(4) What amount of money is needed as working capital for this property?

(5) What is a fair purchase price for this property?

(6) Can the sum of money needed for working capital and to purchase be returned to my client unimpaired, together with an adequate interest per annum for its use?

(7) How long, approximately, will it take to return the whole of the original investment?

These are the questions to be answered, as accurately as possible, before the engineer can adequately give the opinion asked for. Data have to be accumulated, and hence the necessity for a careful, comprehensive and unbiassed examination preceding any attempt at valuation. That such data be accurate, and verified by the examining engineer, is an unquestioned necessity.

A close and careful examination is needed in order to answer satisfactorily the first three questions propounded. The writer is inclined, in his own practice, to consider, at the very beginning of the examination, the character and geology of the immediate surrounding country, since a good grasp of that subject may rapidly elucidate may of the problems met with in the underground examination. An example by Mr. T. A. Rickard* may be quoted here to emphasize the value of a knowledge of the geological features in guiding an engineer on the points of permanency and distribution.

A mine in the mountains of San Juan County, Col., was opened by adit levels, from which stopes were raised and the ore obtained therefrom was found to vary considerably in value, and not to lie in the lines of well-defined pay shoots. A geological examination showed that the country rock consisted of superimposed layers of volcanic breccia and tuffs dipping at a low angle from the horizontal. The veins cut through these layers in an approximately vertical direction, and varied in richness according to the particular rock layer enclosing them. They were found to be enriched where they passed through the fine-grained tuffs, and to be of lower grade

* Mineral Industry, 1902.

in passing through the coarser breccias, and the coincidence of high values with tuff intersections was clearly proved.

The engineer will also do well, in districts where other mines are opened and working, to familiarize himself (when permitted) with the geology of their deposits, and with any peculiarities which they may exhibit; drawing therefrom his conclusions as to the influences which may affect the deposit which he has under examination. The experiences of deeper mines in the same district, as to a change of mineral or vein-filling, are of value and frequently significant; likewise the continuity, or interruption of pay shoots may be duplicated in the deposit under examination. Herein, at the very outset, comes in the greatest factor in the work of examination, namely, the value of a large and varied experience for the examining engineer, for the lack of which no formulae, nor set rules, nor reading, can compensate.

In this first work the engineer will be greatly aided by having good topographical or geological maps of the region. The avidity with which the quadrangle maps of the United States Geological Survey are now sought for points a moral, and gives an excellent example to our Geological Survey at Ottawa. Failing the possession of good maps, the engineer may sometimes be forced into the making of one himself of sufficient accuracy to enable him to lay down his data and draw his conclusions.

To study the methods adopted for the extraction of the ore, the engineer requires to examine into the openings made in the deposit, whether from shaft or incline, sunk off, or on, the vein; and into the matter of levels, their distance apart; the making of raises and winzes; and the vital point of ore reserves, wholly or partially blocked out. He must examine the equipment for extracting the ore from the mine after it has been won, involving the points of tramming, hoisting, picking or sorting, concentrating, etc., etc. These various points open out into the economy or extravagance of the means used, which will require him to note the power, efficiency and economy of the plant; the efficiency and capacity of the hoisting engine, the air compressor and pumping machinery; the cost and quality of fuel, and the possibility of utilizing water power, or installing (or purchasing) electric power. Consideration of these points will perhaps open to criticism the present arrangement of the surface plant as necessitating unnecessary handling, or a larger force of labor than otherwise. Perhaps the quality of the labor may attract especial attention as being below or above the average to which the examiner is accustomed.

These points, if answered adversely, may necessitate estimates by the engineer, of the cost of improving the plant, of obtaining a better supply of labor, or perhaps of building an entirely new plant capable of greatly reducing present costs. To these points will also apply the opinions the engineer will form of the cost of sorting, of the effective or non-effective methods of concentration, to which he is guided by the quality of the products obtained. Study of the rejected portions of the rock broken will perhaps enable him to detect losses and suggest remedies.

For the marketing of the product, he must see the shipping books, sampling works' certificates, assayers' records; must know transportation, smelting or milling charges, and figure whether best results are obtained by present practice.

He notes the accumulation of secondary products, or "middlings," and the capacity and ability of the plant to re-absorb and re-treat these "middlings"; he samples the products coming from the machines from a concentrating point of view, and forms his opinions of the efficiency or non-efficiency of the methods and apparatus used.

Underground he has determined the probable percentage of the pay ore lost on the scaffold, and the approximate percentage of waste rock sent up as "ore"; on the surface he determines the additional loss of ore over the dumps as waste, and in the waste from the sorting floor or shed, unless perhaps the latter may be sent to the concentrator.

By the time the examiner has all the facts relating to the above points and their ramifications, he should be in a good position to answer the questions as to the *cost of extracting and marketing ore* from the mine, and to offer an opinion as to the probable reduction of such cost under circumstances which are feasible.

The occasions upon which the engineer will be called to examine a "going concern," with a long and reliable set of account books behind it to refer to, are few, *very* few, in comparison with the numerous times he will be requested to form an opinion upon properties which have either no record at all, or such a one as is certainly not to be trusted nor quoted. In the few instances in which there is a record of cost of extraction and marketing the ore, it is always advisable to obtain the average of this record, and to compare it with the figures which the engineer has arrived at independently of any such record.

He is now called upon to assume the determination of the average value of the ore, and afterwards (if the value is in excess of the costs) to obtain the total tonnage of positive, and of probable, ore; or, in the lingo of the mine, he is "up against sampling and measuring." He now needs an accurate copy, or original drawing, of the mine workings, both as a plan and as a longitudinal section on the plane of the vein.

Sampling.

To sample a mine's ore reserves is always both tedious and expensive to one's client, yet the determination of the average value of the ore can be obtained in no other way. Occasionally the records of a mine have been so fully and honestly kept that the *past* average value may be gotten from such records, but there is no possible assurance that the *future* average value will be similar or equal, unless a correct sampling is undertaken.

The expense of such sampling is dependent upon many factors—the hardness of the veinstone, the regularity or irregularity of the distribution of values, the doubt or certainty as to the honesty or trickiness of the vendor, the willingness, or otherwise, of one's clients to bear the expense, and similar factors—necessitating a larger or smaller force of reliable and trained assistants, and a longer or shorter time. In one case* the extent of the workings and difficulty of access made the cost of examination aggregate $22,500.00; sums varying from $5,000 to $15,000 are frequent items for the sampling of extensive and valuable deposits; the writer has been informed on reliable authority that the cost of sampling some of the large nickeliferous pyrrhotite deposits of Ontario has reached the figure of $60,000. By reason of the heavy cost a thorough sampling is not to be undertaken lightly; the circumstances must justify it.

The difficulties attending the impartial and correct sampling of ore bodies become well known to engineers in active practice, and should receive more attention in the technical schools which are fitting young men to be mining engineers. The amount of incorrect sampling and calculation which the

* Silver Peak Mine, Nevada.

writer has personally witnessed, is his reason for suggesting that the subject may profitably be treated in the curriculum of our mining schools. During the past few years a number of valuable papers on the subject have appeared, to which he cannot refer in detail, but which are to be found in the transactions of the various mining and metallurgical societies, and the volumes of the technical weekly and monthly papers.

It is advisable for the examiner to make his first trip through the mine workings in company with the superintendent or foreman, when special points will attract his attention, and explanations be suggested. He may have his attention drawn to the size and dip, or character and extent, of the pay shoots, and may note dislocations or interruptions, and will be able to observe that certain facts seem to control the value of the ore. A few samples taken here and there and assayed on his return to the surface will throw light upon much that he has observed, and may determine whether a thorough sampling is necessary or unnecessary.

At any rate, this preliminary examination will enable the engineer to formulate his scheme for sampling, if one is necessary. Since sampling is a laborious task, it is well not to pursue it for a longer time than eight hours in any one day with any one crew. It is usually done by men working in pairs, who are employed solely by the engineer, and whom he has proved and found trustworthy. If the character of the ore and the circumstances of the case render one sure that the miners are not, and will not be, in collusion with the vendor, each pair may consist of a miner and an assistant, which allows the miner to do the muscular work to which he is habituated, and leaves the assistant free to collect the chippings and to keep his eyes open to watch for fairness.

The sampling of veins may be carried out by any one of three systems, which are subject to infinite variations, due to each examiner's experience or idiosyncrasies, and due also to the varied character of mineral deposits.

The first system aims at securing a correct average through the taking of a great number of small samples. Since the underlying principle of sampling is to obtain a correct general average of the value of the piece of ground under test, it is evident that the larger the number of samples cut the closer will be the approximation to the real value, provided the samples are taken at equi-distant points, and provided also that each sample cut represents a *true cross section* of the vein or deposit.

As to the intervals between consecutive samples, these depend upon the regular or irregular distribution of values, and upon the regularity in width of the ore body. If the distribution is irregular, inclined to segregate in spots or bunches, and the width suddenly pinches or expands, closer intervals are required than when the width is practically constant and the distribution of values regular. In some of the gold quartz veins of Ontario and Nova Scotia the interval should not exceed three feet, while at the Dufferin Mine ten feet intervals would not be too great. In some of the silver-copper veins of British Columbia twenty feet intervals would be permissible,* whereas many of the pyrrhotite deposits of that province would not allow greater intervals than five to ten feet.†

Among the veins in Clear Creek County, Colorado, ten feet intervals are quite short enough, and with many of the amygdaloid belts of Michigan twenty to twenty-five feet would be permissible.

* *e.g.* The Silver King Mine, Nelson, B.C.

† *e.g.* Le Roi and Deer Park Mines.

The sample (by this system) is sometimes cut by a small hand pick or geologist's hammer, but is beter taken with a moil and single-hand hammer. The objection to the pick is that the point, unconsciously perhaps to the operator, will get out an undue proportion of the softer portions of the vein, while the poll of the hammer equally tends to find the harder portions. It is better, in almost every case, to use the moil and hammer, and to cut a continuous groove across the section of the vein at right angles to its strike. The width and depth of this groove will vary according to the size of the sample desired, which in its turn depends upon the character and nature of the ore, the hardness of the vein-stone, its richness, and upon the conveniences at hand for treating large samples. In ordinary cases, and for veins not exceeding ten feet in width, a groove from three to four inches wide, and from a half to one inch in depth is quite sufficient.

It will be found in most cases that samples taken at ten to twenty feet intervals, with channels of the size above mentioned, are sufficient. If the results of the assays show wide discrepancies between two successive samples, new samples may be cut half-way between the divergent samples. The mention of this re-sampling brings up a not infrequent case in the sampling of mines carrying precious metals, and one on which I have found quite a divergency of views; the hypothesis may be stated as follows:—

Ten samples have been taken at ten feet intervals along an ore shoot showing in the roof of a level. Beginning at the first cut, the value of the samples have been:—

No. 1	$ 7.60
No. 2	8.20
No. 3	8.10
No. 4	7.80
No. 5	120.20
No. 6	16.00
No. 7	0.40
No. 8	7.10
No. 9	6.00
No. 10	8.20

The arithmetical mean of these figures is $19.56, but No. 5 sample is so divergent from the approximate regularity of the values of the other samples that it must be verified or discarded. If a new sample be taken from the No. 5 groove, and again a value of about $120 a ton is obtained, the fact does not tell the engineer whether there is a gradation from $7.80, ten feet to the left up to $120, nor whether there is a similar gradation to the right, towards No. 6, and if the new sample affirms the high assay, there are few engineers who would care to take the average of the ten samples at $19.56, the arithmetical mean of all the assays, or who would use the value of $120.20 in the so-called "foot-ounce" calculation. Some engineers would throw out the high sample altogether and take the mean of the remaining nine samples, or $8.38.

Re-sampling may prove the value given to be accidental or erroneous, in which case there remains the possibility that this one sample has been salted. Good practice now would require that samples should be cut half-way between No. 5 and No 6, and half-way between No. 4 and No. 5; if the new samples (No. 4a and No. 5a) confirm the original high value of No. 5, their mean may be substituted for the original value in calculating foot-ounce values, or, if they do *not* confirm the original high value, their mean also may be substituted. The practice to be followed in each case will be governed by the

conditions presenting themselves, and by the personal knowledge of the engineer, but it is well to emphasize the special precaution advisable in repeating any one sample, and the preference for cutting samples on both sides rather than for repeating the original cut.*

(To be continued.)

A MARKET FOR CANADIAN LEAD IN JAPAN.

The Canadian Government's commercial representative in Japan writes as follows:—

Having received an inquiry recently as to the probable prospect in Japan for the exportation of lead ores from British Columbia, I have made investigations on this subject. My information is to the effect that it will be difficult to do this unless the ore is sufficiently low in price to leave a margin of profit after paying freight and other charges. The fact is that the three or four principal Japanese firms who are doing the smelting and refining of lead are mine owners themselves, and have their plants at the mines, which, as a rule, are inconveniently situated as regards transportation by water.

The only refinery that is situated at a convenient seaport is one at Osaka, owned by the Mitsu Bishi Kaisha. The refinery has, however, been established for the refining of copper produced at the company's mines. That of lead is done only as subsidiary work. As will be gathered from the figures following, there has been a gradual falling off in the production of lead in Japan in recent years. This is not owing to the scarcity of lead to be mined, but because of the less remunerative nature of mining on account of the depreciation in value of silver and lead, and also the comparatively low price of imported lead, which chiefly comes from Australia. In consequence of this, some of the lead mines have suspended working while others are being worked only irregularly.

The mining people here seem inclined to the belief that the importation of lead ores to be smelted and refined in Japan will not pay. The following Japanese firms, who are engaged in coal, copper and lead mining, have their own smelting and refining works:

Takata Shokai, Yaesucho, Tokyo; Mitsu Bishi Goshi Kaisha, Yaesucho, Tokyo; Mitsui Bussan Kaisha, Kayabucho, Tokyo; Sumitomo & Co., Tokyo.

PRICES OF VARIOUS METALS.

The following were the standard prices of the various metals in the Yokohama market during December, 1904:

Zinc sheet	per 133 lbs.	$ 5 70
" for roofing	"	5 00
Brass plate	"	24 00
Lead (Australian)	"	4 50
Tin	"	42 00
Copper plate	"	29 00
Spelter (best)	"	8 25
" (medium)	"	6 50
Tea lead	"	6 40
Sheet lead	"	4 75
Paints, white zinc 4 tins, each containing 25 lbs		9 40
Paints, white lead 4 tins, each containing 25 lbs		6 25
Paints, red lead 4 tins, each containing 25 lbs		6 00

* For a comprehensive discussion of sampling, with mathematical demonstration, reference is made to Mr. Rickard's article, op. cit. pp. 723-728.

IMPORT DUTIES ON METALS.

The import duty on metals is as follows:—

Zinc, block, ingot and slab	per 133 lbs.	$ 0 28
" sheet	"	0 70
Brass plate	"	3 40
Lead, pig, ingot and slab	"	0 21
" sheet	"	0 49
" pipes and tubes	"	0 55
Tin, block, ingot and slab	"	1 68
" plate and sheet	"	10 p.c.
Yellow metal, sheet	"	2 00
Copper, plate and sheet	"	3 60
White zinc	"	1 00
Lead paints	"	1 00

The duties mentioned above include the increases to be made on and after July 1, 1905, as war taxes. Zinc sheet No. 2 and tin lead are free from duty.

LEAD AND ZINC.

The import of lead and zinc during four years ended 1903 was as follows:—

Lead, block, ingot and slab.

1900	$463,576
1901	438,114
1902	255,356
1903	313,047

Zinc, block, ingot and slab.

1900	$343,040
1901	115,279
1902	127,500
1903	200,984

Zinc plate No. 2.

1900	$298,404
1901	254,752
1902	390,934
1903	354,859

Lead is chiefly imported from Australia and the United States, and zinc and zinc plate from Germany, Belgium and Great Britain.

OUTBURSTS OF GAS AND COAL AT THE MORRISSEY COLLIERIES, BRITISH COLUMBIA.*

By James Ashworth.

Introduction.—Whilst the writer was in British Columbia a few months ago, Mr. R. G. Drinnan, the general superintendent of the collieries of the Crow's Nest Pass Coal Company, Limited, favoured him with the particulars of unusually large outbursts of gas and small coal, in the No. 1 mine at Morrissey. The mine is situated about ½ mile east of the terminus of the Morrissey branch line of railway, and about 4,000 feet above sea level (about north latitude 49 deg. 15 ft., and west longitude 114 deg. 56 ft.)

All the seams of coal worked at these collieries crop out at the surface; and at the No. 1 mine, the seam is a very soft, non-bituminous coal of irregular thickness, varying from 14 to 40 feet. The seam, dipping north-eastward at an angle of about 25 degrees, has a strong roof and floor. It probably cor-

* Trans. Inst. M. and M.

responds with No. 61 seam, marked on No. 1 section of the Crow's Nest Pass coal field made by Mr. J. McEvoy.*

Three levels have been driven straight into the mountain-side, two of these serving as intake-airways, and the middle one as the return-airway to the fan. The lower level, the main haulage-road, entered about 20 feet above Morrissey creek and extended westwards for a distance of about 2,200 feet. It was cut in the top part of the seam, and had a rock-roof and a coal-floor. The ventilation of the mine was maintained by a fan, producing at the time of the outbursts about 60,000 cubic feet of air per minute, at a water-gauge of 0·75 inch. Three shifts of colliers were employed, and, although little or no gas was found in the mine, all the underground employees used Wolf safety lamps.

Outbursts.—(1).—On August 6th, 1903, about 2.30 p.m., and whilst work was proceeding as usual, the coal at the face of the main level commenced to emit sounds as if the mine would close up. It was deemed advisable to withdraw the men; but, before they were all out of the mine, an outburst of gas and coal occurred, which very quickly filled the whole mine with gas. So great was the force exerted by the pent-up and escaping gas, that small coal and dust were blown out of the mine, across the creek, and the ventilation was reversed. It was noticed that the water-gauge in the fan engine-house remained unaltered. No entrance could be effected into the mine, until four days after the outburst, although the fan was kept running at its highest speed. About 1,456 tons of small coal were loaded out of the main level, and 174 tons out of the parallel level before the faces were reached. For a distance of 150 feet outbye from the face, the main level was completely filled with dust and small coal and not a setting of timber remained standing in that length. About half of the coal-pillar, on the higher side of the level, was removed for a distance of 100 feet outbye from the face (Fig. 2, Plate III.): D being the portion of the pillar that was blown off, and E a cavity, 8 to 10 ft. wide and 110 ft. long, that was blown out at the same time.

(2).—After this outburst, the greatest precautions were taken to guard against a possible recurrence, but, despite these, another outburst took place on October 14th, 1903; and although it displaced only about eight hundred tons of coal, and the gas was smaller in volume, yet it was more disastrous, because four men were smothered by the fine dust and gas. It was evident from the position in which the bodies were found, two hours after the outburst, that they had some premonition of danger, and had moved away from their working places. The quick recovery of the bodies was due to the reversal of the fan, which, as is usual in this district, could be quickly converted from an exhausting to a blowing fan by mechanical arrangements placed within the engine-house of the fan. This provision for changing the direction of the ventilating current may seem a little strange, but it is sometimes resorted to in the winter months, to assist in clearing away accumulations of ice from the main intake-airways.

Several outbursts of gas of small volume had, previous to that of August, 1903, occurred in the winning headings, but none had occurred in any other part of the mine.

The inspector of mines, in his annual report for 1903, wrote in reference to this mine, which he inspected every month:—"Notwithstanding the repeated outburts of gas, I am bound to say that this mine could scarcely be put in better order..... They are working, in the first place, about ten feet of the top. Ventilation is very good here; there are three connections with the outside, and they are making another near the face, where most of the men work, so that in case of an accident or outburst of gas the men in the upper workings will be almost outside..... After one of these blowers has come away, it is quite a time before gas can be found in the mine."

(3).—An important precaution, which the management adopted, was to reduce the number of shifts worked to one in every 24 hours, so as to allow for gas-drainage, and for the following 13 months this appeared to have operated successfully; but, immediately after these notes were drafted, even this provision was found to be ineffective, and on November 18th, 1904, about 11.50 a.m., another huge outburst occurred, causing the deaths of 4 Englishmen, 10 foreigners and 2 mules.

The overman of the mine had just returned to the surface, after inspecting every working-place in the mine, and had found everything in its usual condition and not a trace of gas showing anywhere.

Only one man escaped from the mine: he was working at A, about four hundred feet inbye on the main level, when suddenly his lamp flared up and was extinguished, but this did not seem to have alarmed him, as he heard no unusual noise; he, however, felt as if something was catching his breath, and walked out of the mine to get his lamp relighted. Not until he saw a cloud of dust issue from the tunnel-mouth did he seem to have realized that anything was wrong. The dust found in the mine was as fine as flour, and that blown out of the mine with the gas was so fine that the men who saw it reported it as smoke.

For thirty-five minutes after the outburst occurred, it was impossible to approach any of the three entrances to the mine, although the fan was speeded to its utmost capacity; but after this interval the fan commenced to gain the ascendency, and the rescue-party were able to move slowly along the main tunnel. The first body recovered, that of a brattice-man, was found about five hundred feet from the entrance. This man was on his way into the mine, and had put down his lamp upright on the floor, a little farther inbye. It is supposed, therefore, that after his lamp was extinguished by the gas, he had put it down and attempted to escape. No. 2 was a miner, who was on his way out of the mine before the outburst occurred, he had, in fact, just finished a cut-through at the level-face near Brindach's place. Nos. 3 and 4 were drivers with a mule, and they did not appear to have made any effort to escape, as the body of the mule was between them and heading into the mine. No. 5 was another driver, who appeared to have suspected that something was wrong, and had left his mule near where No. 12 body was found. Nos. 6, 7, 8, 9, 10, 11 and 12 appeared to have left their working places all together, and made an ineffectual attempt to escape. Inbye from No. 12 body, the level was practically filled up with dust, there being only an open space of 6 to 8 inches near the roof. All these men were carrying their lamps, but from the position of some of them it was assumed that they were walking in the dark, and had all come from working places near the face of the upper level. No. 14 was the only man who was fully dressed, and had his lunch bucket with him. No. 13 was the body of Greenman, who was working in the main level, and it was his duty, if anything went wrong, to see that all men were out, and then to close the safety-doors, B and C, situated near No. 7 body. These safety-doors were hung on strong frames, and were held open by strings, so that, in case of danger, the last man could close them behind him, and thus prevent gas and dust from overtaking him before he reached the outside of the mine.

It is quite clear that the first warnings of an outburst were not so definite in character as on previous occasions, and that

* "Summary Report on the Operations of the Geological Survey for the Year 1900," by Dr. G. M. Dawson, *Annual Report of the Geological Survey of Canada*, 1900, vol. xiii., section A, pages 84 and 95; "Summary Report on the Operations of the Geological Survey for the Year 1901," by Dr. G. M. Dawson, *Ibid.*, 1901, vol. xiv, section A, Nos. 759 and 767, maps.—Trans. Institution of Mining Engineers.

they were not sufficient, at first, to alarm the men seriously, several of whom had been present when previous outbursts had occurred, and who were always on the outlook for signs of unusual pressure on the coal. This outburst also differed from previous ones in the total absence of violence along the roads. A safety lamp would fill with flame, twenty-four hours after the outburst, when held on the top of the fan-chimney, and a week afterwards there was a distinct cap on the lamp-flame in the return-airway.

The volume of air passing along the main level, as measured a few days before the outburst, was 57,000 cubic feet per minute, and the self-recording water-gauge, on the fan, showed absolutely no change during, before or after the outburst.

The mine had been shut-down for several months, and only a few places in the level-faces were being worked; and, for a month prior to the outburst, not a single report of gas had been made by the fireman.

The management estimate that this outburst displaced 3,500 tons of coal, 800 tons being removed to recover No. 14 body, which was found with fully three feet of dust under it, and it is supposed, therefore, that the man was wading through this depth of dust when he fell. One man, who was overtaken, was found in the attitude of running, upright on his feet, head leaning forward and hat on, and this fact, of itself, shows that there was no violence.

It is pretty clear from the foregoing particulars, that the men working at and near the face of the top level, received some warning before any check to the air-current could demonstrate to those on the road that an outburst was in progress, because they had run from 600 to 700 feet; whereas No. 5 had only run 500 feet, and No. 13, the same distance. Neither No. 1 nor the man who escaped appeared to have taken warning from the check to the air-current, as had No. 1 done so, he ought to have escaped alive.

The check to the ventilation must, however, have been very severe, and its extent may be realized by noting that both of the intake air-currents were pushed towards the entrances of the mine, without the self-registering water-gauge in the engine-house of the fan showing any signs of increased pressure; and, therefore, it is fair to assume that the volume of gas given off must have exceeded 57,000 cubic feet per minute. Again, it may be noted that the volume of gas given off did not exhibit any signs of great violence, such as might have been expected if it had been suddenly released from a huge cavity. Nevertheless, it was enormous in volume, and continued at high pressure for thirty-five minutes, and at a diminishing pressure for a considerable time afterwards. It may, therefore, be reasonably supposed that from 2,000,000 to 3,000,000 cubic feet of gas, at atmospheric pressure, were set free by the outburst in thirty-five minutes. Mr. James McEvoy, who does not accept the cavity-theory, estimated the volume of gas at 5,000,000 cubic feet.

Remarks.—It does not seem reasonable to the writer to imagine that this tremendous volume of gas could be pent-up in a cavity in the coal-seam, and, taking into account the great quantities of dust, which have been a feature of all the outbursts in this mine, he has considered several probable solutions of the problem. In doing so, he has noticed that petroleum and natural gas are found in these Cretaceous measures; and also that on the south-eastern side of this coal field seepages of petroleum have been found, and petroleum has already been and is still being sought in the Flathead district of south-eastern Kootenay.

The presence of petroleum in this district opens up the interesting geological problem of its source. Geologists state that there are no rocks in the district likely to contain stores of petroleum, but prospectors allege that there is visible evidence of its presence in several places. The late directors of the Geological Survey of Canada, Dr. G. M. Dawson and Dr. A. R. C. Selwyn, personally examined the district and identified the rocks as belonging to the Cambrian age, in which oil has never been found, as they are too close-grained and compact to be capable of absorbing oil. Dr. Dawson calls it "a somewhat anomalous occurrence of petroleum;" and if, as he suggests, these older rocks have been, by a gigantic overthrust, slipped eastwards over the Cretaceous formation, then the overthrust fault must extend from ten to twelve miles eastwards. Mr. W. F. Robertson, the Provincial Mineralogist for British Columbia, states that seepages of oil occur in three or more places; that there might be a body of oil underground, but that this is problematical; and that, although some oil was found in a bore-hole at a depth of 1,120 feet there was no flow, and he is not sanguine that even at a depth of 3,000 feet a profitable flow of oil will be obtained.

The writer has referred to the oil controversy, because he thinks that the outbursts of gas referred to as having occurred at Morrissey may, and probably have, some connection with petroleum. The samples of oil obtained by Mr. W. F. Robertson, and reported on by the Provincial Assayer, proved that the oils were of exceptionally low specific gravity: one sample consisted almost entirely of the lighter constituents of petroleum. It appears possible, and also probable, to the writer, that these frequent outbursts of gas may be attributable to the volatization of light oil or spirit, which has been absorbed in patches of the soft coal, and, on being released by the removal or thinning of the surrounding coal, becomes volatized with accompanying violence. As layer after layer of saturated coal is blown off, the dust is carried away by the gas, and the outburst continues until the oil-saturated mass is blown off and the oil or spirit volatized. Under these conditions, the outburst would exert its greatest effect at the outset, and then gradually die away, as in the instances at Morrissey. If gas only were confined in a pocket, the writer does not see how so large a body of coal could be displaced; whereas, if a volume of oil were disseminated throughout a very soft portion of a coal-seam, which would, therefore, have the same absorbent qualities as a sponge, when the first burst occurred, the spongy coal would be carried away by the volatization of the oil, and, as this proceeded, dust and gas would be continuously blown off, until the oil-saturated mass was exhausted. This supposition would allow of a very large volume of gas at high pressure being given off through a long period of time, and thus account for, what is at present, the mystery of the Morrissey outbursts. So problematical does the possibility of working the mine with any reasonable sense of security appear to the owners, that the writer understands that they have closed the mine.

In conclusion, the writer hopes that the subject may provoke discussion and suggestions from members, who may think that the mode of working, and the precautions taken to guard against such outbursts, can be so effectively improved, that the further working of the mine may be rendered reasonably safe.

THE BRITISH COLUMBIA LEAD SITUATION.

To the Editor:

Sir:—In your April number, under the caption of "The Lead Situation in British Columbia," you say:—

1. "British Columbia mining has had enough to stagger under during the last three years, owing to the apathy of the investing public, and the bad odor into which the whole province got through the selfish misrepresentations and actions of the boomers who flourished from 1896 to 1901."

2. "The REVIEW is also insistent on taking the ground that any industry dependent for its existence upon the supply of Government aid, either in the shape of bounties or duties, had better be left to die a natural death inasmuch as its prolonged existence is at the expense of the rest of the community, and inasmuch also as no amount of artificial feeding can make the infant strong and lusty."

3. "British Columbia must work out its own salvation in the matter of its mines," etc.

If I may be permitted, I will make reply to this unjust arraignment of the mining industry, and this province, my warrant being nine years' residence in Rossland, and twenty-two years in the province.

Loyalty like charity begins at home. Were it not that so large a proportion of our population, have as yet only brought their physical beings here, having left their hearts and their loyalty in the provinces or countries from whence they came, you would have been deluged with refutations of this vicious, and misleading attack, which savors of knocking a man down from behind, and kicking him for falling.

Re paragraph "1." If after the word "boomers" you had added "who flocked there in large numbers from all over the Dominion and the United States" and flourished, etc., you would have made a fair statement of fact.

Re paragraph "2." Take away your bounties and duties from all the other industries and put them on a parity with us, and let them live a natural life, or as you put it, die a natural death with us, and we are satisfied, but don't exact tribute from us for the protection of all the other industries, and leave us without, and then flout us with being dependent on them. Give us an opportunity for a natural life, and we will willingly take our chances of a natural death.

Now, as to "artificial feeding." You should have said artificial choking, followed by artificial death, for no jury of fair-minded men, holding an inquest on the mining industry, could ever bring in a verdict of death from natural causes. For evidence of choking I beg to refer you to a Canadian Tariff Book, "Duties of Customs," chap. 16, page 9, section 14, and following sections.

Section	14—Meats fresh, not elsewhere specified	.03	per lb.
"	15—Canned meats, poultry, game, extracts of meats, fluid beef and soups	25 p.c.	ad. val.
"	16—Mutton and lamb, fresh	35 "	" "
"	17—Poultry and game	20 "	" "
"	18—Lard, lard compound, cottolene, etc.	.02	per lb.
"	23—Soap, common laundry	.01	" "
"	24—Soap, Castile, mottled or white	.02	" "
"	25—Soap, not elsewhere specified.	35 p.c.	ad. val.
"	26—Pearline and other soap powders	30 "	" "
"	30—Eggs	.03	per doz.
"	31—Butter	.04	" lb.
"	32—Cheese	.03	" "
"	33—Condensed milk, including weight of package	.03¼	" "
Section	34—Condensed coffee, milk foods and all similar preparations.	30 p.c.	ad. val.
"	35—Apples, including duty on the barrel	.40	per bbl.
"	39—Potatoes	.15	" bush.
"	42—Hay	$2.00	" ton.
"	43—Vegetables, not otherwise provided for	25 p.c.	ad. val.
"	49—Oats	.10	per bush.
"	50—Oatmeal	25 p.c.	ad. val.
"	53—Rice and sago flour, and sago and tapioca	25 "	" "
"	55—Wheat	.12	per bush.
"	64—Sweet potatoes and yams	.10	" "
"	65—Tomatoes, fresh	.20	" "
"	394—Clothing, general	35 p.c.	ad. val.
"	219—Boots and shoes, h. e. s.	25 "	" "
"	407—Caps, hats, etc.	30 "	" "

And so on, *ad infinitum*, for things we consume.

And now for some few things we use, starting with something we use in large quantities.

Section	21—Candles, n. e. s.	25 p.c.	ad. val.
"	291—Shovels	35 "	" "
"	289—Picks, mattocks and tools of all kinds	30 "	" "
"	229—Bar iron or steel, costing less than 2½c per lb.	$7.00	per ton.
"	236—Steel, costing more than 2½c per lb.	.05 p.c.	ad. val.
"	238—Iron and steel railway bars	30 "	" "
"	243—Forgings of iron or steel of whatever shape or size	30 "	" "
"	248—Cast iron pipe of every description	8.00	per ton.
"	252—Wrought iron or steel tubing, plain or galvanized threaded or coupled, or not 2½ inches or less in diameter	35 p.c.	ad. val.
"	253—Other iron or steel pipe or tubing, n. e. s.	30 "	" "
"	254—Iron or steel fittings for iron or steel pipe of every description	30 "	" "
"	269—Wire rope and wire cable, n. e. s.	25 "	" "
"	315—Steam engines, boilers, ore crushers, rock crushers, stamp mills, cornish and belted rolls, rock drills, air compressors, pumps, and all machinery composed wholly or in part of iron or steel, n. o. p.	25 "	" "
"	412—Blasting and mining powder.	.02	per lb.
"	414—Nitro glycerine, giant powder and other explosives	.03 "	"

and so on *ad infinitum*, for things we use.

The above are a few of the imposts which comprise the artificial choking to death of the mining industry. In strong contrast to these duties on what we consume and use in winning our product permit me to refer you to sections 492 and

556, covering all our mine products, and you will find they are absolutely free from protection of any kind.

Re paragraph "3." You say "British Columbia must work out its own salvation in the matter of its mines," etc. Cavalier advise I must say. The B. C. mining industry is in the position of a man who has had his arms and legs tied and been thrown into the sea, and then you come along and call out to him, to save himself the best he can.

It is just as well to start out from a good foundation, and ascertain our true relationship to the Dominion, and the latter's relation to the mining industry, and understand our position. British Columbia joined the Dominion, July 20th, 1871.

The policy of a protective tariff was not adopted until 1879, such being the case, it was impossible for us when we joined to have foreseen, or discussed the effect of such a policy on the destiny of this province, or to have made provision for a contingency of this kind.

Lode mining was not an industry either in this province or in the Dominion when the protective tariff policy was adopted, hence the effect of a tariff in relation to it could not be provided against, and our mining industry has never been put on a parity with the other industries because it was born too late to get its share of the spoils.

Evidence of choking and tariff drain. Now, as to the tribute exacted from us by the working of the tariff, due, in some measure, to the isolation of the industry and its environment, and its great distance from the manufacturing and supply centres of our country, 2,200 miles from Toronto and 2,400 from Montreal, so that when we are not paying a tariff of 25 per cent. and upwards, we are paying a protection price, and a long haul freight bill.

In the year ending June 30th, 1903, the Province of British Columbia paid to the Dominion Government, $2,417,117.84 in customs duties alone, and in other revenue $528,213.59, making the payment for the year (excluding internal revenue) $2,945,-331.46. Vide Tables of Trade and Navigation Returns for 1903, page 75.

The province's own revenue for the same year amounted to only $2,044,630, so that the Dominion Government exacted from the province $900,701 more than the province exacted for her own uses.

The Dominion exaction amounted to $14.40 per head per annum, based on an estimated population of 204,463.

The Provincial exaction amounted to $10 per head per annum on the same population. (Vide Dominion Year Book, 1903, page 560.

Based on accurate Census returns for 1901, which gives a population of 178,657 persons to the Province of British Columbia, the amount per head contributed to the Dominion Government in that year was $14.16 on the total revenue of $2,530,366. (Vide Census Report No.1, and Tables of Trade and Navigation for 1901, page 36.)

Rossland, with a population in 1901 of 6,159, plus the sub ports of Trail and Paterson, with an estimated population of 1,200, making a total of 7,359, contributed a revenue to the Dominion Government of $134,444.87, or $18.96 per head. (Vide Census Report No. 1, and Tables of Trade and Navigation for 1901, page 36.)

The above comparisons serve to show that Rossland, a purely Gold Copper Mining Camp, contributed over 33 per head more to the Dominion Government than the average of the whole province.

The following comparisons will serve to show that the Province of British Columbia contributed 240 per cent. more than the average of all the other six provinces.

Census Year, 1901.

Province.	Population.	Revenue paid to Dom. Gov't.	Amount per Head.
British Columbia. ..	178,657	$ 2,530,366.20	$14.16
Quebec.	1,648,898	10,692,014.99	6.48
Ontario..	2,182,947	10,929,053.17	5.00
Nova Scotia..	459,574	2,096,739.25	4.56
Manitoba..	255,211	1,018,880.67	3.99
New Brunswick.. ..	331,120	1,152,327.31	3.48
Prince Edw'd. Isl'd.	103,259	148,438.16	1.43

Vide Census Returns, vol. 1, year 1901, pages 2, 3, 4, 5, as to population; Tables of Trade and Navigation as to revenue, year 1901, pages 23 to 39 inclusive.

The above comparison shows the Province of British Columbia paid the Dominion Government $10 2-6ths of a cent per head per annum more than the average paid by the other six provinces, or

$ 7.68	per	head	per	annum more than Quebec.
9.16	"	"	"	Ontario.
9.60	"	"	"	Nova Scotia.
10.17	"	"	"	Manitoba.
10.68	"	"	"	New Brunswick.
12.73	"	"	"	Prince Edward Island.

According to Census returns in 1901, we represented slightly less than 3 1-3 per cent. of the entire population of the Dominion, and yet we contributed over 8½ per cent. of the revenue, excluding internal revenue, and independent of the indirect revenue paid at other ports, but repaid by the consumers at the mines. In other words, while we form only one-thirtieth part of the population we contributed slightly less than one-eleventh of the revenue.

The foregoing clearly shows how burdensome a protective tariff is on a country trading in raw products, and how extremely exacting it is on the mining industry.

The prime difficulty with British Columbia is that its destiny is controlled by two forces, the Dominion and Provincial Governments. The former have adopted a tariff policy which has the effect of sapping the life blood out of the chief industries of this section of the Dominion, imposing a burden intolerable, a barrier to progress insuperable, operating as a wet blanket on all the efforts of the Provincial Government to develop the resources of the country.

Admitting that it may be adapted to the agricultural and manufacturing Eastern Provinces, it is most detrimental to a country winning raw products, and especially minerals.

It is admitted that the aforesaid policy is justifiable as a measure of self-protection and self-preservation.

It is also acknowledged that it is impossible to devise a uniform tariff equitable to all, but it is not impossible to equalize by compensatory refunds or subsidies.

While our subsidy of eighty cents per capita from the Dominion Government is on a parity with that of the other provinces, our contribution in customs revenue alone is in the disparity of $14.16 for this province as against an average of $4.15 for the other six provinces. Many may suppose that we get a refund of this excess from the Dominion Government in disbursements made by them on public works. A statement prepared by the Provincial Government in an appeal for better terms from the Dominion Government, shows that since our union in thirty-two years we have contributed $49,397,238, and have had expended by them $32,454,382, a balance to our credit of $16,942,856, out of which $13,274,511 was contributed in the last ten years.

Rossland (a purely gold-copper mining section) in ten years, ending June 30th, 1904, has paid the Dominion Government in

Customs duties	$893,055.58
Inland revenue	167,989.57
	$1,061,045.15

Who can say that this is not too much tribute to exact from one struggling mining district. In conclusion, defending the granting of a bounty on lead and justifying a demand for a bounty on copper.

It is plain that no uniform adjustment of the tariff can ever meet the inequalities (created by the tariff) between the mining and other industries, it can only be done by a refund or drawback, for suppose a tariff were imposed on copper coming into Canada, it would only increase the cost to the consumers without benefiting the producers in the slightest degree.

We have no copper refinery in Canada, and if we had, it would simply absorb the tariff, for unless it did it couldn't live in competition with refineries in the United States having a product of 307,610 long tons to handle in 1903, against our 19,322 tons. The beneficent effect of a bounty is finely illustrated in the pamphlet just issued by the Dominion Government, entitled "Mineral Production of Canada, 1904." (Copy enclosed.)

In the Schedule, page 9, showing increase or decrease as the case may be, you find as follows:—

Lead	increased in quantity	109.49,	and in value		113.05
Iron	"	"	62.41	" " "	27.41
Copper	"	"	.67	decreased in value	2.47

In the year ending June, 1904, lead received a bounty of $195,284.22. Iron received a bounty of $1,408,232.60.

Copper received nothing, has no protection, but the tariff extorted a contribution, greatly in excess of the other industries for protecting them, and helping to pay the aforesaid bounties; it is clearly an anomalous position, is it any wonder the mining industry is not prospering?

Crushed by the juggernaut of a tariff, hopeless for want of a champion, and a realization of our political importance, the mining industry is, indeed, dying an unnatural death, an example of statesmanship indifference, and neglect.

Rocked to sleep in the cradle of tariff ignorance, to the lullaby of indirect taxation, the people of this province, will one day wake up shivering, from being robbed of the clothes of protection, for their mines and timber, to which they are entitled, then there will be some attention paid to us by the Dominion Government, or secession will follow.

Yours truly,

JOHN DEAN,

Rossland, B.C.
June 3rd, 1905.

LABOUR CONDITIONS AT THE CROW'S NEST COLLIERIES.

An agreement has been signed between the Crow's Nest Pass Coal Company and its employees, these latter being members of the United Mine Workers of America, by which it is expected that all danger of labour disturbances at these collieries will be averted for some time to come. The agreement provides that in any case where it may appear that an employee has not been treated fairly that the company will meet a pit committee, appointed by the U. M. W. of A., but before any of the men shall submit a grievance to the pit committee he shall endeavor, by application to the pit boss, to settle the matter. The pit committee is first to meet the pit boss, or mine manager, but in case of their disagreement, the matter shall be referred to the superintendent of the company, and from him to the manager of the company, but, pending these investigations, work at the mines shall be continued. The pit committee is permitted to have access to the mines, from time to time, to make examinations for the purpose of investigating any dispute between officials of the company and men employed in the mine. It is optional for the miners to work partners, but no individual miner is allowed more than one labourer to work for him. The company undertakes that an equal turn of cars is offered to each miner. The company officially recognizes the United Mine Workers of America, and concedes the check-off system. All fixed expenses of the mine, in respect to rent, water, light, sanitation and domestic coal, remain as heretofore. Any miner failing to earn the minimum rate of $3.00 per shift, owing to an abnormal condition of his working plans, is to be paid a sufficient amount to secure him the said minimum.

In every month, the Monday after pay day shall be a holiday. In case an employee is thrown out of employment, unless discharged, he is to be given preference over new men in other mines in the same camp operated by the company. Any employee absenting himself from work for two days, except through sickness, may be discharged. The company is to deliver all timbers as near the working face as possible, or at the mouth of the room. The company is to pay the wages of one man on the day "McGinty" is being moved. One man shall have only one place, and only one shift in such place, the single shift system being adhered to. This article, however, refers only to gangways, rooms and crosscuts. After levels are turned from slopes or inclines, to conductor car, the said gangway, or level, shall be turned over to other men. In the event of a contractor on incline or slope desiring a gangway, or level, he is to have the preference.

In an attached schedule, the Crow's Nest Pass Coal Co. agree to pay specified rates for mining and yardage to underground workers at the respective collieries.

The following schedule of wages for shift-men, agreed upon, may be useful for reference purposes:—

Blacksmith helpers (10 hours)	$2.50
Mine carpenter (10 hours)	3.50
Mine carpenters' helpers (10 hours)	2.50
Power house engineers (8 hours)	3.00
Power house engineers (12 hours)	3.50
Fan men (12 hours)	2.50
Hoist men (8 hours)	2.75
Box car loader engineer (10 hours)	3.00
Tipple engineer (10 hours)	3.00
Electric locomotive engineer (8 hours)	2.75
Electric locomotive engineer helper (8 hours)	2.50
Firemen (8 hours)	2.50
1 R.R. car handler (10 hours)	2.25
All other outside labourers (10 hours)	2.00
Fire boss	3.50
Shot lighters	3.00
Brattice men	3.00
Brattice men, helpers	2.50
Timber men	3.00
Timber men, helpers	2.50
Driver boss	3.00
Drivers	2.50
Tracklayers	3.00
Tracklayers' helpers	2.50
Miners, in wet places	3.50
Motormen	2.75
Motormen helpers	2.50
Hoist men	2.75
Rope riders	2.50
Couplers	2.50
Pushers	2.50
Labourers	2.50
Timber handlers	2.75
Switch boys	$1.25 to 1.50
Door boys	1.00
Pumpmen	2.50
Shift-men above ground:—	
Head dumper (10 hours)	2.50
Slate pickers (10 hours)	2.00
Slate pickers, boys (10 hours)	1.25
Car oiler (10 hours)	2.00
Car oilers, boys (10 hours)	1.50
Tally boy (10 hours)	1.25
Teamsters (10 hours)	2.50
Blacksmith (10 hours)	3.50
Coke oven employees are to be paid as follows:—	
Levelling and drawing (6½ ton charge per oven)	$1.00
Levelling and drawing (5 ton charge per oven)	.80
Loading (when 200 tons or less a month loaded) per ton	.16
Loading (when over 200 tons a month loaded) per ton	.17
All charges to be large or small at discretion of coke superintendent.	
Locomotive engineer (10 hours)	3.00
Larry men (10 hours)	2.00
Plasterers (10 hours)	2.00
Carters and cleaners (10 hours)	2.00

GOVERNMENT EXPLORATIONS IN ONTARIO.

The Ontario Bureau of Mines proposes to carry on active and systematic explorations during the present season in sections of New Ontario, and parties have been sent out as follows:—

(1) Into the Michipicoten mining division, to complete the investigation of the iron ranges, the party to be in charge of Dr. A. P. Coleman, who has already worked over part of the field.

(2) Into the region west and northwest of Lake Abitibi, under the direction of Mr. H. L. Kerr, Geologist of the University of Toronto.

(3) Into the district near Cnapleau Station, on the Canadian Pacific Railway.

(4) Into the Loon Lake iron region, in and near the township of McGregor, east of Port Arthur, where Mr. L. P. Silver will examine and report upon the iron ore deposits, zinc ores and other minerals of the locality.

(5) Prof. W. G. Miller will meanwhile continue the examination of the rich silver-cobalt area on the T. & N. O. Railway, which has attracted so much attention, and will also institute a thorough inquiry into the clay and shale resources of the province, being assisted in the latter work by Mr. M. B. Baker, of Queen's University, Kingston, and also by Mr. E. T. Corkill, Inspector of Mines. In addition, the Bureau has made special provision for procuring particulars regarding the important development now going on in the petroleum and natural gas areas in southwestern Ontario.

THE EDUCATION OF MINING ENGINEERS IN THE UNITED STATES AND NEW ZEALAND.

Prof. Howard Eckseldt, of Lehigh University, South Bethlehem, Pa., recently contributed an interesting paper on the subject of "Mining Education in the United States." In the course of his remarks he stated that forty, and even a less number of years ago, the general public opinion was against engineering education, and even to-day one occasionally meets a manager or superintendent who boasts that no college men are to be found in his employ; but, happily, this state of affairs is now passing away. The length of the course of study in most of the mining schools is about four years, though, in some cases, a five years' course is still maintained. There is, however, a strong tendency towards shortening the length of the college year, at many schools at present the terms being limited to thirty-two weeks. The present average age at which mining students enter colleges is about 18½ years.

In respect to instruction in mathematics, the present tendency is to do away in a large measure with the old method of teaching from text books, with their series of rules and abstract problems, and to substitute practical problems in everyday engineering. The importance of physics has not been realized by some engineers, but the recent advances in electrical research have brought this subject into greater prominence. The study of physics involves a considerable amount of laboratory work, but there exists a tendency to carry such work too far when the student begins to do it mechanically, or does it simply with a view of completing the work required. A course in specifications, estimates and contracts is included in the courses of construction, although some engineering schools omit the study of the English language from their curriculum. Prof. Eckseldt very sensibly remarks that one of the first requirements of an engineer is his ability to express himself well and grammatically, and he therefore deplores the fact that this subject is ignored in the way it is. The courses, of course, include a thorough instruction in chemistry, surveying in all its branches, geology, crystallography, mineralogy and metallurgy.

Prof. Jas. Park, director of the Otago University School of Mines, New Zealand, remarks that the course of study prescribed in a mining school, while in every case based on first principles, commonly reflects the dominant mining industry in the place or district. In New Zealand, technical education in connection with mining is provided as follows:—(1) By schools of mines situated in the chief mining centres; and (2) by a University Mining School, carried on as a faculty of Otago University, one of the affiliated colleges of the University of New Zealand. The goldfield mining schools provide for the instruction of underground mine managers, battery managers, and assayers. the university mining school for the training of mining engineers, mining geologists, mine and battery managers, mine surveyors, and metallurgical chemists.

There are six primary mining schools. Four are situated in the Auckland goldfields, at Thames, Waihi, Karanjahake, and Coromandel; and two on the west coast of South Island, at Reefton and Westport. councils elected by the local subscribers. The classes for the convenience of the students (chiefly miners and battery workmen) are mostly conducted during the evening.

The Otago University Mining School occupies a position in relation to mining almost identical with that of the mining academies of Germany. It grants associate diplomas in mining, metallurgy, and geology; and prepares students for the B.Sc. degrees in mining and metallurgy. All the subjects of instruction for the associate diploma are taught up to the B.Sc. standard. The associate course nominally covers three years, but in fact never takes less than four. The session consists of two terms of three months each, with a recess of three weeks between the terms. The long summer vacation of five months is occupied by students in practical mining, metallurgical, geological, or engineering work.

The dominant industry in New Zealand and the Commonwealth of Australia is gold-mining, and as nine-tenths of our graduates engage in that pursuit, the course of study is drawn up so as to encourage specialization in that direction. In all the associate courses, the first two years are devoted to pure mathematics, applied mathematics, physics, mechanics, general geology, mineralogy, petrography, and geometrical drawing. The third and fourth years are spent in advanced laboratory work and lectures, field practice in land, mine and engineering surveying, mechanical drawing, with special reference to mining plant and appliances, etc. The metallurgical course deals prominently with the mechanical recovery of gold from gravels by hydraulicing, elevating and dredging; the crushing, pulverizing, and concentration of ores; the treatment of gold ores and silver ores by amalgamation, chlorination, cyaniding, etc.; and with the construction, erection and working of the machines, plant and appliances used in these processes. Colonial experience has shown that an exact knowledge of land, mine and engineering surveying is one of the most necessary and most valuable qualifications of a mining graduate; and for this reason candidates for the associate diploma in each division of the mining school are required to take a two years' course in surveying.

Students who have passed the class examinations in all the branches of study prescribed for any division are entitled, without further examination, to the diploma of that division.

THE USE OF COAL FOR METALLURGICAL PURPOSES.

Mr. J. Stevens Jeans, who for twenty-seven years was Secretary of the British Iron Trade Association, and for seventeen years Secretary of the Iron and Steel Institute, recently gave evidence before the Roval Commission on Coal Supplies in Great Britain, on the use of coal for metallurgical purposes. The evidence, in many respects makes interesting reading. He said:

The economy in the consumption of fuel was one of the greatest importance to the iron industry, which was vitally affected by the supply and cost of suitable fuel. The iron trade in its collective capacity had for many years past been the largest individual source of coal consumption in Great Britain. At the time when the report of the Argyll Coal Commission was made, in 1871, the total annual output of British coal was computed at 117,000,000 tons. Of that output, not less than 32,000,000 tons were consumed in the iron and steel industries, being 30 per cent. of the total output. Since then the relative consumption of coal in the iron trade had fallen off, partly in consequence of the vast increase of the relative importance of coal exports, and partly because steel had very largely taken the place of wrought iron, with a much reduced consumption of coal per unit of output. The average consumption of coal per ton of finished iron in the palmy days of the finished iron industry was about 3 tons (it was taken by the Argyll Commission at 3 tons 7 cwt.), whereas the average consumption of coal in the steel industry per ton of ingots was not more than, say, 12 cwt., with some addition to the consumption for finished materials. Probably an average of 15 cwt. would represent the coal consumption per ton of plates or rails throughout.

The best record for any single year had been two tons of coal per ton of pig iron produced for the country as a whole. Since 1873, which was memorable as the year of the great coal famine (when the cost of fuel reached a level not attained before or since), the average consumption of coal in the pig iron industry per ton of pig had been reduced by just about half a ton, which meant about 4,000,000 tons a year on our total iron output. Theoretically, this consumption should be still materially reduced, not only by bringing to a lower level the absolute quantity of coal used to smelt a ton of pig iron, but also by getting a greater useful effect out of the coal used through the blast-furnace gases, in raising heat for other purposes, and thus displacing fuel that would otherwise be needed for power requirements. Much has been done in the iron trade of late years to bring about economy of fuel, and there were very few iron or steel works that had not made experiments of their own, designed to reduce the fuel bill. There were those who did not think that in daily practice much increase of economy was possible in either pig iron or steelmaking, but this was a problem to which no one could provide a reliable solution in the light of past experience, except upon the ground that the possible margin of economy had been greatly reduced.

THE ONTARIO SCHOOL OF PRACTICAL SCIENCE.

A new building has recently been erected for these schools, where, in future, instruction in chemistry and mining will be given. On the lower floor are situated the electro-chemical laboratories, which are thoroughly well equipped with electric furnaces and other appliances, in addition to general laboratories. Space is also set aside here for a museum, while there is also an excellent lecture room. In the upper floors are the Mineralogical and Geological Departments. The Mining Department is now being equipped with machinery for experimental work, including a 15 h.p. motor, a 5 stamp battery Challenge ore feeder, amalgamating plates, and a Welfley concentrator. There is also a Hadfield gyrating crusher and a set of Hamilton rolls 16 x 12 inches.

THE MARKET FOR PORTLAND CEMENT.

An increase of twenty-eight per cent. is shown in the sale of Portland Cement in Canada, as compared with last year's returns. On the other hand, a decided decrease in the use of natural cement is reported. In 1904, Canada imported three-quarters of a million barrels of Portland cement, and these imports are certain to steadily grow less with the development of the local industry. The Dominion has large resources of raw material for the manufacture of cement well accessible to the markets, and within the last year two important works at least have been established.

THE HUNTINGTON-HEBERLEIN PROCESS.

Experiments are now being made with the Heberlein process in connection with the smelting of galena ores, at the Sulivan smelter, Marysville, B.C. The following note, therefore, on the process, which was published in the Engineering and Mining Journal, of June 15th, will be of local interest:—

In the Huntington-Heberlein process, galena is mixed with quicklime, the whole raised to a temperature of 700 deg. C. (1,300 deg. F.) and air is blown in, whereby the lead sulphide is changed to the oxide and is fused by the heat of the reaction. In the similar Carmichael-Bradford process, the lead sulphide is mixed with calcined gypsum, and the blowing-in of air is performed at a somewhat lower temperature (900 deg. C.), the result being practically identical with that of the Huntington-Heberlein process, though the intermediate reactions, of course, may be slightly different.

ELECTRIC FURNACE CONSTRUCTION.

An interesting example of the introduction of electro-chemical methods into old industries is offered in the manufacture of pure artificial corundum. The Norton Emery Wheel Co., an old-established firm, with its main works at Worcester, Mass., purchased, several years ago, the patent of C. B. Jacobs for fusing bauxite in an electric furnace, thereby producing a pure artificial corundum. The fused charge is allowed to cool slowly, when it acquires the hardness of corundum and the toughness of emery, and is suitable for wheels, stones, and all the various uses of an abrasive. The process is worked in a plant of the Norton Emery Wheel Co., at Niagara Falls. A rather extended and interesting exhibit at the St. Louis Exposition showed that the process is in a state of very healthy development.

A patent granted on November 22nd, to A. C. Higgins, general manager of the Norton Emery Wheel Co., is evidently intended for the special purpose of making artificial corundum, or, "alundum"; but is of more general interest since it shows how, by judicious furnace design, any special refractory lining with its troubles may be avoided. His furnace consists essentially of an iron shell forming the outside of the crucible with suitable means for applying water on the outside of the shell to all its parts in a continuously flowing stream or blanket, and conducting it away at the base. The portion of the charge in immediate contact with the cool shell solidifies and thus forms a lining for the rest of the molten mass. The lining consists, therefore, of solid alundum. Similar linings have been used with success in other electric furnace industries.—Elec. World.

THE BOUNTY ON LEAD ORES.

The following figures are supplied by Mr. G. O. Buchanan, dispenser of the Government Bounty on lead, at a meeting last month to the Nelson Board of Trade:—

Beginning with the present fiscal year, dating from July 1, 1904, the Canadian smelting works received in July, 2,103,255 pounds of lead; in August, 1,446,139; September, 2,287,164; October, 1,391,382; November, 947,168; December, 1,488,330; January, 1,295,399; February, 938,301; March, 514,104; April, 173,948; total for the ten months of the present fiscal year being 12,205,490 pounds of lead. It will be observed that the receipt of lead for the past three months has dwindled considerably, which fact has been due to the Hall Mines smelter getting, under a mutual agreement with Trail, the bulk of the ore offering.

In the same period the figures for the Hall Mines smelter were as follows:—July, 1,065,494; August, 2,117,313; September, 977,605; October, 1,221,501; November, 1,048,262; December, 1,407,927; January, 1,726,154; February, 2,255,077; March, 777,409; April, 1,784,985; the total for the ten months being 14,381,727 pounds, or slightly more than the Trail works.

In addition there has been the lead smelted by the new stacks at Marysville and to the Sullivan is credited for February of this year, 352,871 pounds, for March, 1,717,829 pounds, and for April an additional 455,631 pounds. The total for the Sullivan is therefore, 2,526,331 pounds and for the three smelters for the ten months of this fiscal year, 29,113,248 pounds or 14,556 tons.

But this is not the total of the lead so far produced, for to these figures must be added the ore exported, coming altogether from the St. Eugene. In July last were exported 2,386,591 pounds, in August, 1,342,435, in September, none; October, 220,113; November, 1,032,968; December, 1,555,063; January, 1,405,362; February, 1,097,069; March, 3,959,231; April, 3,073,337, totalling 15,982,169 pounds for the ten months, or 7,991 tons. This makes the total tonnage of lead raised for the period under consideration 22,547. It will be noticed that the St. Eugene is sending out very large shipments of lead for the past two months. For the whole fiscal year only 11,000 tons may be exported and claim the bounty of 50 cents per hundred and the St. Eugene therefore has to ship over six million pounds in two months if that mine would reap the full advantage of the export bounty.

The bounty paid on this ore is approximately, for the home smelted product, $208,000, of which the St. Eugene has earned $103,000 and all the other mines combined $105,000. The approximate return is only given as for some of this ore claims have not as yet been presented by the shippers and the bounty will then have to be calculated according to the varying London price, for as lead reaches over £12 10s on the London market so a diminished rate is given here.

In addition there is the bounty paid on exported lead by the St. Eugene which amounts to another $75,000 approximately.

During the first fiscal year of the bounty the St. Eugene earned $45,634 on both classes of ore and all the other mines combined $149,579, the latter figure including the earnings of the Highland mine at Ainsworth which received from the government $37,088.

The total bounty earned to date by all mines is, therefore $195,214 for the first fiscal year and $284,244 (approximate) for ten months of the second, or a total of $419,467 to date, of which the St. Eugene has taken $244,922 (approximate).

For the first fiscal year there were shipped 13,397 tons, and during ten months of the second 22,547 tons, showing that a material impetus has been given to the industry. Out of this total output during the first year were exported 1,133 tons, and during the ten months of the present fiscal year 7,991 tons, or about 25 per cent. of the total amount produced.

THE MONTREAL & BOSTON CONSOLIDATED.

The properties of this concern were recently reported on by Mr. M. M. Johnston, as follows:—

The property consists of one smelting plant, situated at Boundary Falls, and fourteen mineral claims and fractions of other claims in various parts of the Boundary district. This plant has two furnaces, 40 by 176, with a daily capacity of 300 tons. Three directly connected Connersville blowers, one 7 by 12 steam locomotive, slag cars, sampling mill with crushers and rolls, assay office and laboratory complete the outfit. Steam is the motive power. The mineral claims are as follows: The Phoenix camp, containing the Dominion group, is composed of the following claims: The Brooklyn, 18 acres; the Idaho, 37 acres; the Stemwinder, 12 acres; the Standard, 8 acres; Montezuma, 42 acres; Rawhide, 31 acres. The Wellington camp contains the Athelstan, containing 17 acres, and the Jack Pot fraction of 17 acres. The Summit camp contains a three-fourths interest in the Mountain Rose, containing 17 acres, and a half of the Lancashire Lass, containing 44 acres. The Deadwood camp contains the Sunset of 19 acres, the C. C. D. of 43 acres, the Crown Silver of 18 acres, and the Morrison of 30 acres. This totals 363 acres. The cost of freighting the ore from the Phoenix and Summit camps via the Canadian Pacific Railroad is 30 cents a ton, and from the Deadwood camp 17 cents a ton. The Athelstan is not connected with the railway.

An analysis of the properties follow: The Brooklyn lode has been developed to a depth of 350 feet and has 3,500 feet of underground workings; the average sample taken from this mine represents the group. Copper, 1.43%; gold, $1.32; silver, 25 cents per ton. There is 260,000 tons of ore available for the smelter, which at current prices has a gross value of $5.86 per ton. The diamond drill indicates that there is an equal amount of ore below the developed ground. The Stemwinder is developed to a depth of 125 feet, but sufficient work has not been done to indicate the tonnage. Samples show copper, 1.40%, gold $1.00, silver 25 cents. The Idaho shows surface indications of the same body that is being successfully worked in the Granby. The Rawhide has 600 feet of underground workings at a depth of 180 feet. Average assays show copper 1.4%, gold 90 cents, silver 25 cents. Available tonnage 230,000 tons, prospective tonnage, 1,000,000 tons. Mountain Rose, the vein has been explored for 125 feet; ore contains 40 to 50% iron, 20% sulphur, and about $1 in copper, gold and silver. It is valuable only as a flux. The Lancashire Lass has a shaft of 50 feet deep and is stripped for a distance of 500 feet and is of the same quality as above and has from 2,000 to 3,000 tons on dump. The Athelstan is merely a prospect. The outcrop shows a large body of oxidized ore, containing gold, silver and a little copper; 4,060 tons of this ore has been shipped to the smelter and the returns show an average of $7.67 in gold. Indications are that there is sulphide ore below the oxide, containing copper values. The Sunset has a shaft 200 feet deep, no drifting below 100 feet. The ores assay copper .6%, gold .80%, silver 20 cents, iron 34%, Silica 23%, and lime 11%.

In conclusion, Mr. Johnston says: "The equipment at the mine is not of the proper type or of sufficient power for economical work. The prospects of obtaining a large tonnage, particularly on the Rawhide and Dominion groups, seems most certain. In order to put the mine on a production of 1,500 tons a day and keep the cost of production down to a point that would make the operation profitable, there should be an expenditure of $250,000 for additional furnace, converting plant, electric power equipment, compressor and mine development. I am satisfied that it can be done at a profit of $1.25 per ton, based on the selling price of copper at 12½ cents a pound."

BRITISH COLUMBIA SMELTING PROMOTIONS.

In connection with the establishment of a zinc smelter at Frank, the following report, contained in a recent issue of the British Columbia Review, of London, may be of interest:—

"In the Chancery Division this week, Mr. Justice Swinfen Eady had before him the case of the Metallurgical Company, when counsel asked, on behalf of the plaintiffs, for an injunction restraining the defendant from disposing of a number of shares in the Royal Smelting Company and the Canadian Metals Company. The defendant was the agent and trustee of the plaintiffs. He went to Canada in order to establish for the plaintiffs a zinc-smelting process. He came back from Canada and introduced the plaintiffs to a number of gentlemen there, and a joint venture was entered into to carry out a joint smelting process. The defendant brought back with him an agreement, under which it was proposed the plaintiffs were to act, and they consented to it, and, in order to raise further capital, entered into negotiations with a gentleman in Paris, who ultimately found the necessary capital. It appeared from the affidavits that the defendant, Mr. Fernau, was the agent and trustee for the plaintiffs in respect of any shares that he had or would obtain in either of the companies mentioned. He had made an offer to the plaintaiffs of £6,000 worth of shares in a certain company, but as he had previously made an offer of £12,000, the plaintiffs could not accept it, and had brought this action, in consequence, for an injunction.

"Counsel for the defendant said he was willing to agree not to part with any shares he might receive from the Royal Smelting and Refining Company, of Canada. With regard to the Canadian Metals Company, the defendant's case was that, in fact, he was not the agent of the plaintiffs, but was prepared not to do anything with any profit he might make. Really, with regard to both companies, the defendant submitted that this action was premature, as no shares had yet come to Mr. Fernau in respect of either matter; while, if an injunction were granted, it would probably spoil the "deal," which formed the subject of the agreement.

"His Lordship said he would grant the plaintiffs an injunction until the first motion day next sittings, which would give the defendant an opportunity of stating the facts fully."

PROSPECTIVE SALE OF THE CONSOLIDATED CARIBOO HYDRAULIC.

Since sending the article, appearing on page 123 of this issue, to press, we learn, on the best authority, that the directors of the Consolidated Cariboo Hydraulic Mining Company have given an option on their property to Mr. John Hays Hammond, who is believed to represent the Messrs. Googenheim, and other New York investors and Mr. Hoffman, Mr. Hammond's particular expert, has been at Cariboo, in company with the manager, Mr. Hobson, during the past month, making an examination on behalf of his principal. During this examination, a run of twenty days with the monitor was made, resulting in a clean-up of $20,000. An extension of thirty days has been given to the optionees, in order to enable Mr. Hoffman to make in addition an examination of the Horsefly property. The Review is further informed by one of the officials of the company that a proposal is being entertained by the bondholders, by which, in the event of a sale of the property being made, the holders of the common shares will be enabled to rank proportionately with the bondholders in any division of the proceeds which may be realized from the transfer of the property, and it is understood that a satisfactory provision will be made, by which existing shareholders, upon contributing a pro rata amount towards the retirement of the bonds, will be placed upon this profit-sharing basis.

THE MANUFACTURE OF STEEL RAILS AT SYDNEY.

The Dominion Iron & Steel Co., of Sydney, has notified the Trade and Commerce Department of its intention to commence immediately the manufacture of steel rails. The company recently received an order for 250 tons of steel rails for the Intercolonial Railway. The Nova Scotia Steel & Coal Co., New Glasgow, N.S., has also informed the Department that the manufacture of steel ingots will be commenced early in July.

IRON MINING IN NOVA SCOTIA.

The Halifax Chronicle recently published a leading article on the above subject, to which attention is called to the fact that while the Province's iron and steel industries are thriving, the iron lands of the Province are less productive than they were ten years ago. Our contemporary goes on to state that the production of pig iron, however, has greatly increased of late years in Nova Scotia, but the output of the iron mines has declined from 83,792 tons in 1895, to 50,000 tons in 1904. This decline in iron ore production is attributed to the Government aid afforded to the iron and steel industries, which has resulted in the importations of foreign ores. We quote from the Chronicle as follows:—

These conditions ought not to continue; no stable, national industry can be built up on this insecure basis. Every effort should therefore be made to make our iron lands productive.

The State protected development of our coal fields, has proved a complete success, having made us independent of foreign coal and incidentally shown how rich we are in that precious mineral.

We urge a policy towards the iron lands of Nova Scotia calculated to make us also independent of foreign ores. As long as our iron masters import foreign ores to so great an extent as at present, the Nova Scotian iron mine must languish. The importation of foreign ore should, therefore, be discouraged in every possible legitimate manner.

The Government should, we think, revise the fiscal system so as to make our iron industries stimulate native iron mines, as the factories of Eastern Canada stimulate the coal mines. Either great consumers of iron ore should be subsidized in such a manner that their operations must stimulate the development of iron mines in the country which furnishes the subsidies to them, or the Federal Government should directly subsidize the ore-miner in proportion to his output.

In a subsequent article the Chronicle remarks that the demand for iron ore is now larger than ever before in our history and is sufficient to support iron mining here. But foreign ore is allowed to pour into the Province; indeed, during the past four years more has been imported than our own mines have put out during the past thirty years! These imports of iron ore come in free and interfere with the development of our iron mines to a serious extent; hence the stagnation of the important primary industry of iron mining in this Province.

The local iron and steel maker, when in similar straits, urged that he could not get established. Fiscal protection and bounties were, therefore, granted to help the iron and steel industries, but the iron mine, although quite as essential to the Province, is not directly assisted. The iron and steel companies monopolize the protection and bounties, and, being large importers of foreign iron ore, are powerful competitors with our iron mines. This seems unfair to the iron mines of the Province, particularly as the coal mines, their co-producers of raw material, have long been directly helped by a tax on foreign coal. The result is that the local iron and steel industries, subsidized by the Nation, thrive on foreign ores and our iron mines stagnate.

As the bounties are running off and will presently expire, the funds hitherto devoted to the local iron industries could doubtless be used to stimulate the production of cheap native ores for them; in other words, bounties might be paid directly to the ore miner to encourage the ore mining industry. Should the local iron and steel manufacturers ask for the renewal or extension of the bounties, their neglect of the local iron fields should be inquired into and the consumption of greater quantities of Nova Scotian ore might be made a condition of their renewal, or extension. The encouragement of iron mining in this Province does not present any difficulties that we can discover and in any re-adjustment of the fiscal system, we hope that the welfare of our iron mining industry will be promoted.

YUKON MINING RETURNS.

The United States Consul at Victoria, B.C., reports as follows:—

The gold output for last year decreased $1,329,825 in value from that of the preceding year, the output for the year ended June 30, 1903, upon which royalty was paid, being $12,110,723, against $10,780,892 in 1904. The dryness of the season is given as one reason for the falling off. Generally, it may be said that for mining in a small way Dawson and its vicinity is no longer a profitable location, but large operations are successful and increasing. Nearly all the large companies in the Yukon are controlled by American capital. The financial statement of the Canadian offices at Dawson show decreased receipts of $3,860 for quartz records; $1,868 for recording registered documents, certificates of partnership and of work; $5,600 in payments in lieu of assessment work, and of $924 in crown grants, while there was an increase of $311 in receipts from acreage of land covered by mineral claims. The receipts by the government from the district for the past three years illustrate the boom of 1901-2, the great decrease in 1902-3, and the further falling off in 1903-4. It is believed these figures will be still further reduced in 1905.

BRITISH COLUMBIA.

(From a Special Correspondent.)

Mining in the Kootenay is, from one cause or another, in a somewhat disturbed condition at the present moment. The gold-copper situation in Rossland is tied up to a great extent with the amalgamation scheme which is being mooted with regard to the Trail smelter and the Gooderham properties, together with the Le Roi mine. For if these mines are amalgamated with the smelter, there will be an effort to do without concentration for the time being, and see whether the handling of a large tonnage will not bring down the cost of reduction to that point where concentration is no longer necessary from an economical standpoint. Hence there is no serious effort being made by the mines concerned to proceed with concentration problems. It is true that the Le Roi has about completed its concentrator, but when it is considered that the Le Roi is capable of producing at least from 1,000 to 2,000 tons daily of concentrating ore, and the concentrator is an experimental plant of only seventy-five tons capacity, it is apparent that the absolute necessity of concentration is at present by no means fully admitted. As to the concentrator at Traill, nothing more has been heard of that of late.

The Jumbo mine is again being well spoken of, but until facilities for transportation are introduced, shipping in large quantities can hardly be started.

The Boundary is doing far more steady work, and much interest is being taken in that section, especially by American mining men. The Granby is still improving its plant, and although the temporary shutdown of the Montreal & Boston has militated somewhat against this district, yet the starting up of other properties has more than offset this.

The silver-lead situation is to a large extent controlled first by the trouble as to the bounty on export lead, and also as to the saving of the zinc contents of the ore. At Kaslo, however, a large zinc separator has been erected, and is now in working order, and at Rosebery another is fast nearing completion. At Frank, a zinc smelter is not only projected but is in course of construction, and within this season ought to be completed. At present, lead miners, penalized for their zinc contents, when the said zinc contents are possibly a source of profit, are unwilling to mine until this problem is satisfactorily worked out. Hence the large difference between promise and fulfillment in the production of the lead mining section for the last fiscal year.

The starting up of the Sullivan smelter with a capacity which is to be increased up to 8,000 tons of lead annually, will make a large difference in the mining situation in this province; but as this institution, which is owned largely by Spokane people, is still in its infant stages, operation having been started very late in May, upon this it is as yet far too early to dilate.

In the Nelson district, mining is very quiet, although it is to be noted that the Reliance Mining Company have installed a mill on the Hendry plan, which should be in operation some time during the month of June. The Juno has started work, using the Athabasca mill, and there is some hope entertained that the Silver King, whose lead was at one time thought to have hopelessly faulted, may yet recover its lode, and work something upon the lines which gave the capital of the Kootenay its start years ago.

In the Ymir district, it is announced that the chief mine, the Ymir, is about to start development upon a larger scale than has yet been attempted. The Hunter V., an anomalous property, from a mineralogical point of view, has been doing very well of late, although its ore is extremely low-grade.

In the Windermere division, the Paradise mine, the mainstay of that district, is shut down temporarily, and its opening and the method of work which will be inaugurated thereon will depend largely upon the building of the Kootenay Central Railroad this year. In East Kootenay, the St. Eugene is making big profits, owing in no small measure to the exceptional rates offered by the German lead stacks. The coal company of the Crow's Nest has just entered upon a further two years' agreement with its employees, after long continued and difficult negotiations. This will ensure ample opportunity to proceed with the development of the mines, and with the new smelters coming into existence and the increased output of the others consequent upon the cessation of the bounty on export ore, a larger market is opening for them in the provincial field. In this district also, developments may be shortly looked forward to in the beginnings of development of the coal and oil lands in the Flathead Valley.

In the Similkameen, the Nickel Plate is doing well, but almost every other property is tied up for the want of railway facilities. As it seems probable that both the C. P. R. and the Great Northern will presently be running trains through this fertile country, there is little doubt that the mines of the Similkameen will assume a larger importance in the near future than ever they have occupied in the past.

On the Fraser River the lowness of the water has revived the hopes of dredging, and one or two companies have been spending considerable sums of money in perfecting their plants in readiness.

The Cariboo country is just beginning its season with apparently a good water supply for hydraulicking.

On the coast, interest is again revived in the Britannia mine, which seems to have at last some prospect of being worked. Otherwise, there is little to report there on the mining doings of the past month.

MINING NOTES.

ONTARIO.

Application has been made at Osgoode Hall, Toronto, during the month, by Mrs. Selby, the holder of 154 shares, for the winding up of the Twentieth Century Mining Co. This company was organized in 1902, with Canadian offices in Toronto, the capital being $2,000,000. The petition states that the company was incorporated in 1901, owning mining lands in Manitou, and copper mines in Arizona. After working for two seasons, gold to the value of $40,000 was won. It then became necessary to install a plant, but this was not done, and operations were suspended. Since that time money has been expended in maintaining expensive offices and purchasing additional mining property which has not been worked. Statutes have also been entered by American shareholders, who wish their shares cancelled and demand the return of their investments. The fear of the Canadian is that unless the concern is wound up in this country, shareholders in the United States will have an advantage over Canadian shareholders.

Dr. A. P. Coleman, writing to the Ontario Bureau of Mines from the Michipicoten district, reports that a promising iron property is being developed by Mr. Edgar Brown, of Sault Ste. Marie on Lake Anjigomi, where there is a fine showing of magnetite. In this district also the high falls of the Michipicoten River, where there is a fall of 128 feet, are being developed, with a view of supplying power to the Helen, and other properties in the neighborhood. At the Helen mine, meanwhile, over 100 tons of ore are being taken out daily. It has been ascertained that 180

feet below the old Boyer Lake level, the ore is as good as ever, and a shaft is being sunk to a depth of 120 feet, giving access to a fine body of ore, 400 feet below the original deposit.

Several new discoveries of rich ore are reported from the Temiskaming District, a promising vein of silver having been found at the Earle mine, while ore assaying $2,600 to the ton is reported to have been found on a claim owned by Mr. T. Chester. On this property five leads have been exposed. Near Haileybury a new lead has been discovered on Timmins & Dunlop's claim, at a distance of about three hundred yards from the original discovery. A local paper states that specimens of native silver on this lead have been sacked, the estimate value of which is about $6,000.

The erection of a steel plant at Morrisburg, Ontario, is shortly to be commenced, and it is thought that by October operations will be started at eight mills, the raw material being drawn from Sydney. Another steel works is also to be established at Hamilton, by the Union Drawn Steel Co., of Beaver Falls, Pa. This company has secured a considerable site, upon which buildings are now being erected, which should be ready for use by the first of July.

In the Coppercliff section much activity is anticipated during the present summer. At the No. 2 mine of the Canadian Copper Company a large quantity of ore is being extracted, with two shifts working. The company are about to enlarge the smelter and establish a new laboratory, and a sub-station for electric power. Mr. G. F. Beardsley, an expert metallurgist, is meanwhile in charge of construction operations.

Contracts have been let for the continuation of development work of the Gold Rock Mining & Milling Company's property at Goldrock. After the property has been sufficiently developed, it is proposed to erect a mill to treat the ore. The Gold Standard Mining Company's mine is also being actively developed.

New York capital has recently become interested in the iron and other deposits of the Mimitaki district, where some exploration work is to be undertaken. The Wabigoon Star states that Mr. H. Dalston, the local representative of the Minnehaha Mining & Smelting Co., has received advices from the Buffalo office to the effect that arrangements have been completed for the commencement of development operations.

Application has been made to the Courts for the winding up of the following companies:—Twentieth Century Co., Volcanic Reef Company and the Laurentian Mining Company, the petitions in each case being granted.

During May six new wells were drilled in the Leamington oil district, and shipments were made during the month of 118 tanks, averaging 150 bbls. each. Oil production from this district is steadily increasing.

It is reported that a large deposit of iron ore has been found between Keewatin and Ontario, north of Kenora.

MANITOBA.

What is supposed to be a rich discovery of iron ore has been made at Riding Mountain, Manitoba, and is causing much local excitement. A sample forwarded to Montreal has proved most valuable, if in sufficient quantity. The surface veins indicate a large bed of ore.

ALBERTA.

The Egg Lake Oil Co., which is prosecuting development work near Edmonton, after boring to a depth of 213 feet passed through four layers of oil sand of eight and twelve feet in thickness, respectively. The company has erected two derricks, and also installed pumping machinery. The oil is lifted by a suction pump from the bottom of the well, the product being a fine fuel oil. The Canadian-American and Edmonton Oil Companies are also about to commence development operations.

The zinc smelter at Frank is now nearing completion. It is proposed to complete half the plant by the autumn, which will be operated before winter, the total cost being $350,000.

BRITISH COLUMBIA.

The Coast.—The statement is made that some rich ore has been encountered in the shaft at the Lenora mine, Mount Sicker. In this district the Vancouver Island Mining and Development Co. has taken up an option on twenty-six claims known as the Westholme group, which have been under a course of development during the past eighteen months, shafts having been sunk to depths of 500 and 600 feet, with series of crosscuts. This group of claims is adjacent to the Tyee Mine.

Atlin.—The season in Atlin commenced earlier this year than last, piping on Pine Creek having been started some forty days sooner than was the case in 1904. Meanwhile all is in readiness for the commencement of dredging operations, and the hydraulic companies are now all working.

At Spruce and Pine Creeks the miners have been busy cleaning up winter dumps, and returns are said to be better than was anticipated, especially in the case of the Spruce Creek clean-ups. New areas are being prospected in the Dixie Valley, where ground has recently been bonded to California investors, who have already commenced development work. Mr. Henry Maluing, manager of the Societe Minerie de la Colombe Britannique, has, with associates, recently acquired the Gold Group of mineral claims known as the Beavis properties.

Similkameen.—The Sunset mine on Copper Mountain, which is now controlled by the British Columbia Copper Co., is to be thoroughly explored before the bond matures. Some fine ore has already been taken from the shaft, which is now down some 200 feet.

A bond for $125,000.00 has been acquired on the Fairy Queen group of claims in the Hedley Camp.

Lilloett.—During the process of cleaning-up on the Iowa Company's dredge, a quantity of heavy sand, of a grey color, having also a metallic lustre, was found. A sample of this was sent to Ottawa for examination, and proved to be iron-nickel, oil 47 %, platinum 43 %, and other substances 10 %, including gold and oxide of iron.

As the water in the Fraser River is lower this year than it has been for many years past, it is thought that possibly by August or September bars and gravel beds, which heretofore have not been exposed, may be mined for placer gold, and local prospectors have high hopes of reaping a rich harvest in consequence.

Kamloops.—Commenting on the reports of the Kamloops Mines, Limited, the British Columbia Review, of London, makes the following statement:—

"Despite some encouraging remarks regarding recent developments at the mine, there was a feeling of disappointment that the chairman was not in a position to give the shareholders some definite prospects as to when the dividend-paying stage was likely to be reached. Now that the whole of the machinery has been thoroughly overhauled, and various additions and improvements made, it is expected that it will be possible to treat 160 tons a day. Developments at the mine are reported to be highly satisfactory, there being—it is said—in February last, $900,000 worth of high-grade ore, and sufficient low-grade developed to keep the mill going for three years at the rate of 160 tons per day. What with liabilities, cost of developments, and the amount to be paid for the putting up of a smelting plant, we fancy there will be but little of the money provided by the reconstruction left, so that unless the management pursue a more energetic and up-to-date policy, there seems every probability that the shareholders will again have to find further capital. We have always held the opinion that the company possesses mining claims of great potential value, which, with good and economical management, should quickly reach the dividend-paying stage. In the hands of the original proprietors—The B. C. Exploring Syndicate—the Iron Mask was apparently developed with ability and economy, and great things were expected when it was re-organized under the new title. The new interests appear, however, to have been no more successful in the management of this property than in their Ashanti ventures, and the anticipations formed by their consulting engineer do not seem to us to have been better served when they were interests would seem to us to have been better served when they were entirely in the hands of their local manager."

Lardeau.—Work is about to be again resumed at the Oyster-Criterion mine at Camborne, under the direction of Mr. A. H. Gracey, manager of the Eva gold mines. The Eva mines are meanwhile being steadily worked, and it is contemplated to increase the number of stamps at the mill, and also to install a compressor.

The mill at the Silver Cup mine has now been in steady operation for over a year past, about 100 tons of ore being daily treated. This is regarded as an excellent showing, in view of the fact that when the machinery was first erected some engineers questioned whether it was suitable for the treatment of the ores from this mine.

During the winter, development work was continued at the Triune, and stoking operations are now in progress. Active operations have also commenced at the Mammoth, which is regarded as a property of considerable progress.

Slocan.—Work is shortly to be resumed on the Surprise mine at McGuigan. It is proposed to drift a long tunnel from the south side of the hill to tap the lead at a depth of 700 feet below the present workings. Some 500 feet will be necessary to be driven before the vein is encountered, but a depth of 1,000 feet will thus be obtained on the ore body.

Rossland.—The Rossland Miner states that Mr. P. T. Craven has set up a slime table, recently patented, for saving fine values, in the gulch below the Josie Mill. Since the appliance has been in operation it has treated about fifty tons of tailings a day successfully. The present work, however, is purely experimental in character.

During the past month operations have been resumed at some of the smaller properties of the camp. Leases have been taken on the R. E. Lee and the Lily May, which are being actively worked. The Golden Rule and Cascade Bonanza group are also being operated.

A find of high-grade ore is reported to have been made in the tunnel being driven on Le Roi No. 2. The manager regards the discovery as an important one.

Connection at the 600 feet level has been made between War Eagle and Centre Star mines, thus affording important ventilation. The connecting crosscut runs for a distance of 1,000 feet between the two main shafts.

The Holmestake mine in this district was recently leased to Mr. Claude Palmer, by the Holmestake Mining Co.

A despatch from Rossland states that the winze from the ninth level of the Centre Star has reached a depth of 150 feet, or about 1,400 feet from the collar of the shaft. Sinking is being carried on on the middle ledge of the Centre Star, and ore of payable grade has been encountered from the ninth and below the ninth level. As yet, however, the ore body, which has every appearance of being of considerable magnitude, has not been drifted upon or crosscut. Good ore is also reported to have been found from the 1,550 foot level of the War Eagle.

Boundary District.—The Granby Company has recently bonded the Gold Rock group of three claims in the neighborhood of Phoenix. The property is largely owned by Montreal investors, who some five years ago expended a considerable sum in its development.

Nelson.—The Eureka, Goldleaf, Champion and Alhambra claims, located some seven miles south of Nelson, on Eagle Creek, were recently sold for $40,000 to the local syndicate. As yet, however, little development work has been done, though the purchasers propose to commence operations immediately.

As bearing on the leading article published in the Mining Review last month, commenting on the requisition sent by the Associated Lead Mines of British Columbia to the Hon. Mr. Fielding, it is interesting to note that at a recent meeting a number of managers of important mines addressed the Nelson Board of Trade, strongly opposing any further payment of bounty on exported lead, on the grounds that such a course would be injurious to the general prosperity of mining, smelting and business interests in the Koofenays.

Another sale of mining property is reported from Nelson, the Queen Victoria, near Beasley Siding, being one of the first locations in the Nelson district, having been recently acquired at a substantial figure. There is said to be on this property a large showing of copper.

The lead returns from the Hall Mines smelter for May show a marked decrease, due largely to light shipments from the St. Eugene, the ore from which (for May and June) is nearly all being sent to Antwerp.

The returns are as follows:—

Mine.	lbs. ore.	lbs. lead.
Alice	120,371	81,639
Arlington	43,374	1,952
Charleston	40,802	8,446
Dundee	41,280	2,518
Emily Edith	42,568	22,646
Hewitt	27,348	1,996
Home Run	16,033	1,195
Horseshoe	13,186	2,227
Ivanhoe	128,117	81,059
Last Chance	114,986	42,907
Lorna Doone	10,962	1,129
Lucky Boy	15,691	2,780
Majestic	41,070	28,010
Neepawa	185,612	11,478
Noonday	35,513	10,378
No. 1	36,726	1,285
Ore Hill	3,141	509
Payne	154,815	34,647
Reco	35,739	10,936
Ruth	37,536	8,633
St. Eugene	266,341	170,558
Silver Cup	200,282	33,958
Skylark	37,315	1,231
Standard	56,402	20,587
Whitewater	118,434	50,809
Wilcox	93,558	984
Ymir	234,550	29,756
Total	2,149,952	664,706

Supplementary for April, Reco, 367 lbs. of lead.

The Hunter V. Mine, owned by the B. C. Standard Mining Company, has been closed down for an indefinite period.

Mr. M. Davys, who had leased a number of properties, including the Silver King, Poorman and Granite, in the Nelson district, and the Hewitt and Emily Edith at Silverton, has decided to discontinue his mining operations, in consequence of the acquittal of a union miner, named Roberts, who was charged with shooting at him with murderous intent. Mr. Davys states that he will not resume work at these properties unless he can secure non-union labour in future.

Much activity is reported in the vicinity of Erie. The Arlington mine continues to make steady production development, work being also in progress. The Canadian King and Keystone being operated under lease are also shipping high-grade ore, while development work is being conducted by the Copper Farm M. & D. Co., and two claims have recently been opened up at Green City, upon which promising ore deposits have been exposed.

The assay office and plant of the Reliance Gold Mining Co. was damaged by fire during the month to the extent of $2,000. The loss was covered by insurance, but the incident is none the less a regrettable one, as it will cause a delay in the operation of the plant, which had been put in good working order.

East Kootenay.—Preliminary operations, by means of the Heberlein roasting process, have already commenced at the new smelter erected at Marysville, and a large quantity of ore has now been treated. It is expected that within a few weeks some 300 tons will be treated daily. The two Heinling-Heberlein ovens are meanwhile giving good satisfaction, producing from thirty to forty-five tons a day. The ore from the Sullivan mine is first put through crushers and rolls, and thence conveyed to the automatic sampler, and finally to the ovens. The company has not yet, however, decided to adopt the Heberlein process until its success shall have been thoroughly demonstrated.

Hydraulic operations commenced last month at Perry Creek, where large expenditures have been made during the past two years in equipment.

Mr. N. M. Curran, manager of the North Star mine, who was in Montreal last month, states that arrangements have been made for the commencement of operations upon the Stem Winder, Ontario and Midnight claims, while work is also to be resumed at the North Star.

The St. Eugene will, it is said, declare another dividend of $70,000 payable on the first of July. Since the beginning of the year the St. Eugene has made profits as follows:—

January	$43,000
February	42,000
March	70,000
April	60,000
May	70,000

Slocan District.—The Kootenay Ore Company's zinc plant, situated at Kaslo Bay, is now said to be in steady operation, with a capacity of about 60 tons daily.

In the Ainsworth division, the Highlander Company has purchased the property owned by the Black Diamond Tunnel Company, numbering 12, and adjoining the Highland mine to the west. The Highland tunnel has already been extended some 800 feet into the Black Diamond ground. Work at the mine is to be recommenced shortly.

Milling operations at the Jackson property are now in progress, with two shafts working. The Slocan Star mine is now shipping about 40 tons of silver-zinc ore daily to the United States Zinc Company, Pueblo, Cal. The grade of the ore gives about 40 % zinc, with good silver values.

Mr. Norman Carmichael, manager of the Highland mine, at Ainsworth, recently returned from Europe, having obtained the approval of the directors to his plan of developing the property, and the work is to be proceeded with at once.

Good progress is being made in the driving of the 4,300 foot tunnel at the Rambler-Cariboo, more than half the distance having now been driven. The tunnel, it is estimated, will cost $60,000, and $15,000 additional for equipment. It will, however, enable the mine to be worked much more advantageously.

The machinery for the new zinc enriching plant at Rosebery has now arrived, and it is expected that the mill be in operation by the end of August next.

The Ottawa mine continues to make an excellent showing. The property is owned by Pittsburg investors, by whom it was bought for $13,500. Net profits last year realized $35,000, about 1,200 tons of ore being shipped. At present the mine is being opened up at the fifth level, by a tunnel, and it is proposed to now install an 8 or 10 drill compressor.

Arrangements were made last month for the shipment of the ore on the Arlington (Slocan) dump, to the Hall Mine Smelter. It has been further decided to resume work at the mine.

A considerable tonnage of zinc ore produced last year is being shipped by the Ruth Co. to the Kaslo sampler. On the success of operations in starting this parcel of ore will depend the future working of the zinc deposit in the mine.

Boundary District.—The Granby Company has secured bonds on a number of claims on Kruger Mountain, near Lake Osoyoos, upon which prospecting operations are to be commenced. It is said that these properties contain large deposits of iron ore, which will be utilized for fluxing purposes.

Ore shipments from Boundary mines during the month of May aggregated 80,044 tons, being practically the same as the output for April. At the present rate of production the district should be capable of producing this year a million tons of ore.

A new ore body is reported to have been discovered at the Mother Lode mine, owned by the B. C. Copper Co., by diamond drilling, forty-eight feet of good ore having been passed through.

Some excellent ore has been taken from the Crescent claim, in Skylark Camp, the value of the dump being estimated at $10,000, and the value of the ore at from $100 to $200 per ton.

At the rich Providence mine, near Greenwood, active development work is being prosecuted with a force of forty men, drifting being carried on at the 200, 300 and 400 ft. levels.

At the Highland Queen mine, one of the oldest locations in the district, a fine ore body has been reached by tunnelling, the ore being exceedingly rich. The property was bonded in April last.

The Preston, a claim adjoining the Crescent mine, has been acquired by Chicago investors, who, it is said, propose organizing a company to develop the property.

Mr. J. P. Graves, general manager of the Granby Mines, is reported to have said that the company will shortly commence the sinking of a new three-compartment shaft, with a view to increasing the productive capacity of the mines, to from 100,000 to 150,000 tons monthly.

Another high-grade property, the Duncan, is being developed on the west fork of Kettle River, a streak of rich carbonates having been encountered, assaying in gold and silver values over $400 to the ton. On the Rambler claim, in this locality, a rich body of ore has recently been encountered, and it is proposed ere long to commence rawhiding the Dry Creek and thence freighting to Midway. The cost of shipping ore to Midway is at present $17 a ton.

The Skylark mine, in Skylark Camp, which was bonded to a local syndicate last autumn for $30,000, has already been sufficiently profitably operated to enable the bondholders to meet all the payments from the proceeds realized. It is said that some specimens of silver telluride are being taken from this mine.

The unwatering of the Jewel mine at Long Lake Camp has been completed, and the engineers of the Le Roi No. 2 have sampled the property with a view to its purchase.

Recently the bondholders of the Twin claim, situated in the immediate vicinity of Greenwood, encountered three feet of rich galena ore in the tunnel that is now being driven.

It is reported that the British Columbia Copper Company purposes to increase its capital stock from two to four million dollars.

The new blast furnaces being installed at the Granby Mines are of a capacity of 35 per cent. greater than those at present in use. The capacity of the blower-room is also increased by the addition of a 300 h.p. blower, and a new blower of larger capacity is being placed in the convertor department.

YUKON.

Mr. K. B. McLennan, manager of the Bullion Hudraulic Company, reports that already 175,000 feet of lumber has been cut and hauled to Bullion, to be used in flume construction. The company has also all the pipes and pumping machinery on the ground, and certainly by the beginning of July active operations will be well under way. Excellent reports are also received from Burwash, Fourth of July and Arch Creeks, good pay having been discovered on Fourth of July. It is expected that a large output of gold will be made from the Kluane district this season.

The first shipment of gold from Dawson, consigned to the United States Assay Office at Seattle, is now beginning to arrive, over a million dollars' worth having already been brought down.

Rich discoveries of placer gold are reported to have been made on Highet Creek, a tributary of Mayor River, about 250 miles distant from Dawson.

COAL MINING NOTES.

NOVA SCOTIA.

The imports of bituminous coal from the United States during the month of April aggregated 292,928 tons, a gain of 25,742 tons over the same month of last year. For the ten months ending April 30, 1905, the bituminous exports amounted to 3,705,060 tons, a gain of 162,399 tons over the same period of 1904. The imports of coke for April, 1905, amounted to 61,906 tons, a gain of 23,144 tons over April, 1905.

The Nova Scotia Steel and Coal Company are putting in a double-decked cage at No. 1 Colliery, and are making additions to the plants at other collieries with the object of raising 650,000 tons of coal during 1905.

The Dominion Coal Company sends us the following figures giving the output of the collieries for May:—

	Tons.
Dominion No. 1..	52,131
" No. 2..	45,338
" No. 3..	13,401
" No. 4..	52,113
" No. 5..	63,637
" No. 7..	12,695
" No. 8..	18,643
" No. 9..	31,689
Total..	294,647
Shipments..	274,486

The April shipments of coal from Nova Scotia are as follows:—

	Tons.
Dominion Coal Co.	139,266
Intercolonial Coal Co.	14,191
Cumberland Railway & Coal Co.	37,890
Gowrie & Block House	5,013
Inverness Railway & Coal Co.	5,313
Acadia Coal Co.	13,578
N. S. Steel & Coal Co.	26,330

The daily shipments of coal by the Dominion Coal Co. now average 12,000 tons. It is stated that the coal this year is of a higher quality than formerly, this being due, in a great measure, to the introduction of shearing machines. The new No. 6 mine is now looking very well, the shafting having been lowered down two slopes, the company now employing about 7,500 men.

Fire bricks recently manufactured from Drummond Colliery fire clay have been tested at the Steel Works, Sydney, with, it is said, most satisfactory results. It is proposed now to erect two kilns capable each of producing 80,000 bricks per month, in order to supply the local demand. These collieries are now maintaining a coal output of about 900 tons daily.

The Acadia Coal Co., who are sinking two new shafts near Stellarton, N.S., have struck the Ford seam at a depth of 900 feet. This seam is said to be one of the largest and most valuable deposits in Nova Scotia. When the two new shafts are completed and ready to begin producing at full capacity, the company will be in a position to quadruple their present output.

A despatch from Sydney, C.B., states that the Dominion Coal Co. is not likely to send coal to Sweden this year, as it has done for several years past. This is due to a breach in the contract between the steamship company and the Dominion Iron and Steel Co., by which the steamship company was to carry Swedish ore to Sydney as return cargoes.

The St. Lawrence Coal Co., who own considerable coal properties at North Sydney, N.S., will shortly commence operations, and install a plant with a capacity of raising 500 tons of coal a day, Charles Brandeis, consulting engineer, Montreal, has been retained as chief engineer of the company.

Coal was recently struck at a depth of 890 feet in a No. 2 Allan shaft. This is recorded by the Maritime Mining Record as a matter for great congratulation.

The only company to show a large increase for the four months, as compared with the corresponding period of last year, is the Nova Scotia Steel & Coal Co.

The production of the Dominion Coal Company in May was 294,489 tons; the tonnage for the year to June 1st, is 1,034,191 tons.

The manager informs us that shipments from the Cumberland Ry. & Coal Co.'s collieries, for the month of May, aggregated 38,256 tons.

ONTARIO.

The contract for furnishing and erecting the coal handling machinery for the Canadian Northern docks at Port Arthur, Ont., has been let to the Mead-Morrison Mfg. Co. The docks are to be operated by the Pittsburg Coal Co., Pittsburg, Pa. The plant will consist of one patent transfer and pick-up bridge, a large storage system, two movable steel towers equipped with 16 x 24 direct acting engines and two-ton Rawson buckets.

The Canadian Coal & Ore Dock Co. will build a combined coal and ore dock at Port Arthur, Ont. The first section, to be 3,000 by 600 feet, will be completed this year. It is proposed to dredge a channel, about two hundred feet wide and 3,000 feet in length, from the harbor, which will cross the end of the dock, and to divert into it the waters of the creek and river.

It is stated that coal consumption in Ontario is increasing rapidly, in keeping with the industrial development of the province. The newspapers contain daily reports of the erection, or proposed erection of a large plant and factories, while a number of new companies are being incorporated for manufacturing purposes. Most of this activity is centred in the manufacturing localities of Toronto, Hamilton, London, Brantford and Berlin.

ALBERTA.

The Canadian Pacific Railway is completing extensive arrangements for supplying Winnipeg and other Manitoba points with semi-anthracite coal from Banff, Alberta. W. H. Aldridge, who is in charge of their department of mining and metallurgy has gone west to superintend operations. Development is being pushed on four large seams and the coal is being carefully screened and cleaned by emery pickers and spirals similar to those in use in Pennsylvania. The Canadian sizes will be similar to the American. It is intended to start shipments about June 1, arrangements having been made for the handling of the coal by Winnipeg dealers. It is calculated that it can be delivered to consumers at about fifty cents per ton less than the American hard coal. The Canadian coal is a little higher in volatile matter, somewhat lower in fixed carbon, and from two to three per cent. lower in moisture. It is freer burning, but more brittle than the American and requires careful handling, but the fact that cars can come through without transfer is counted on to offset this disadvantage. An approximate comparative analysis is as follows:—

	Fixed carbon.	Volatile matter.	Ash.	Moisture.
Canadian Anthracite..	80.85	7.10	6.18	½-1
American Anthracite..	82.87	3.5	6.10	2½-3½

The Breckenridge & Lund Coal Co., at Lubreck, have ordered complete machinery equipment for the mine which is now being actively developed. This shipments from the Lille collieries have during the month been largely increased.

The Western Canadian Colliers Co., operating the Lille and Bellevue mines, has arranged with the United Mine Workers of America upon a wage scale, which is to be in force for the next two years.

It is reported that fire has again broken out at the Frank mine, the attempts to smother the previous fire having been unsuccessful.

BRITISH COLUMBIA.

The first step toward testing the law that has caused the closing down of No. 1 mine at Nanaimo was opened at Ladysmith when, acting under authority of the coal mines regulation act amendment. Mr. Archibald Dick, inspector of coal mines, laid two informations at Ladysmith charging Harry Carroll, miner, and A. Bryden, superintendent of the Wellington Colliery Company's Extension Mines, with breaking the law which provides that men must not be underground more than eight hours. It is understood that action taken by the government to enforce the law will be made the basis of an appeal to test its constitutionality, as it has been reported that if the law was enforced Mr. Dunsmuir would appeal at once to the higher courts and carry the question to the Privy Council if necessary.

As a result largely of the recent legislation passed by the Provincial Government, making eight hours a legal day's work from bank to bank in coal mines, the Western Fuel Company's properties at Nanaimo have been closed down, the company claiming that it is impossible to work the mines at a profit under the new conditions, unless men are willing to accept a lower rate of wages. The men are represented by two labour organizations, namely: The Western Federation of Miners and the United Mine Workers of America.

Some fine specimens of semi-anthracite coal have recently been brought down from the Peace River country. These were analyzed by Mr. H. Carmichael, Provincial Assay of British Columbia, who found them to contain a very high percentage of fixed carbon, with a minimum percentage of ash. The discoverers have located some 25 square miles of coal bearing country in the Peace River.

A contract has at length been let for the construction of a branch line of the Canadian Pacific from Spencer's Bridge to the Nicola Coal fields, a distance of 45 miles. The construction of this road will result in the opening up of the valuable coal areas in the Nicola section, where, already, preliminary exploration work has been successfully carried on.

A special dispatch to the Nelson Daily News states that it is reported on excellent authority from Coleman that the coke ovens and the mines which supplies them are both closed down. The reason given is that a contract has been signed between the Crow's Nest Pass Coal Company and the Granby Mines by which the former will supply all the coke that is needed in the smelter for the next two years.

The Seattle and Washington Coal Co. have been formed in Seattle to acquire and develop about four square miles of coal lands near Coutlee in the Nicola Valley.

MINING MEN AND AFFAIRS.

The itinerary of the American Institute of Mining Engineers, which is holding its annual meeting in Victoria, B. C., this year, is as follows:—

Leave New York, June 23, 7.55 a.m., on special train, Penn. Ry.
Arrive Spokane, June 26, 8.30 p.m., by Gt. Northern.
Leave Spokane, June 26, 9.30 p.m., by Gt Northern.
Arrive Nelson, June 27, 8 a.m.
Leave Nelson, June 27, 11.30 p.m.
Arrive Rossland, June 28, 4 a.m.
Leave Rossland, June 28, 11.30 p.m.
Arrive Marcus, June 29, 2 a.m.
Leave Marcus, June 29, 2.15 a.m.
Arrive Grand Forks, June 29, 4.30 a.m.
Leave Grand Forks, June 29, 11.30 p.m.
Arrive Spokane, June 30, 7.10 a.m.
Leave Spokane, June 30, 7.30 a.m., by Great Northern.
Arrive Seattle, June 30, 8.30 p.m.
Leave Seattle, June 30, midnight, by steamer Princess Victoria.
Arrive Victoria, July 1, 6 a.m.
Leave Victoria, July 5, noon, by Princess May, for Dawson.

On returning from Dawson by special steamer the party will leave Vancouver on July 23, at noon, over the C.P.R., making stops at various points in the mountains on the way back to New York.

Just as we go to press, information reaches us of the transfer of the Gooderham and Blackstock mining interests in British Columbia to a Montreal and Toronto syndicate, which has thus acquired a controlling interest in the St. Eugene, War Eagle and Centre Star mines. It is likely, we are informed, that the Trail smelter will also be purchased by the syndicate. The mines will continue to be operated under the

direction of Mr. Jas. Cronin, as general manager. This arrangement will, in no sense, interfere with the proposed amalgamation of the Le Roi, War Eagle and Centre Star mines, provided, of course, the Le Roi Company endorse the arrangement as agreed to by Mr. G. S. Waterlow, who recently visited Canada officially in connection with these negotiations.

Mr. S. C. De Witt has been appointed sales agent for Allis-Chalmers-Bullock, Limited, Montreal, for the Maritime Provinces, with headquarters at Halifax. Mr. De Witt is a graduate in electrical engineering of Lehigh University, Pennsylvania, and has had considerable experience in different lines of electrical work. For the past three years he has acted as manager of the De Witt Electric Co., Ltd., with places of business at Sydney, Glace Bay, Pictou, Truro, and Fredericton. He is a son of Dr. De Witt, the present mayor of Wolfville, N.S., and being a native of the province, and well acquainted with eastern business, will no doubt prove a valuable acquisition to the company's staff.

We quote the following from the Maritime Mining Record:—"Sydney Mines has a little man of very moderate weight, 72 years old, who for fifty-nine years has worked in the coal mines down there. He entered the pit when thirteen years old, and has worked at all branches of mining. For over twenty-seven years he mined coal. For the past thirty years he has been acting in the capacity of deputy. During 1904 he worked 366 days, thereby setting a good example to bigger men. He is still hale and hearty and can travel five hours at a stretch without resting. His long mining life has never quenched his love of talking in the good old garden tongue—the Gaelic."

It is announced that the Dominion Government have appropriated the sum of $15,000 for the purpose of making experiments with the electric process for smelting ores and manufacturing steel at Sault Ste. Marie. The Consolidated Lake Superior Power Company have generously placed a plant and a dynamo, capable of supplying 400 h.p., at the disposal of the experimenters for four months. The tests will be made under the direction of Mr. Herault, the inventor of the process bearing that name, and ores of various character will be experimented on.

At a meeting of the Nelson University Club, last month, Mr. S. S. Fowler read an interesting paper on "The Building of the Ore Vein," in which he discussed the urgent distribution and methods of working mineral deposits. In concluding his address, Mr. Fowler stated that in spite of the fact that many phenomena in connection with rock formations still represented unsolved problems, there was no doubt that rapid progress was being made in the attainment of metallurgical knowledge.

Dr. Poole, who was for some years Inspector of Mines in Nova Scotia, but who is now a member of the staff of the Geological Survey, will be occupied during the present season in surveying and mapping the coal measures of Vancouver Island. Dr. Ellis, who was engaged last year in surveying the Nicola Fields, for the Department, has meanwhile proceeded to the Queen Charlotte Islands, to certify and report on the coal masures there.

Mr. A. B. W. Hodges, general manager of the Granby Company, is to be congratulated on the success of his electrical self-charging device, recently installed at the company's smelter at Grand Forks. It is said that a saving in cost has been effected of from thirteen to fifteen cents per ton by the use of this appliance, which Mr. Hodges has patented in the United States, Mexico and Canada.

McGill University, at its recent convocation, conferred the degree of Doctor of Science on Prof. Douglas McIntosh. Dr. McIntosh graduated as Bachelor of Science from Dalhousie College in 1896, afterwards obtaining the degree of Master of Science at Cornell University. He then continued his studies in Germany, and upon returning to Canada joined the staff of McGill University.

Mr. G. A. King superintendent of the St. Eugene concentrator at Moyie, B.C., and Mr. G. Clothier, mine superintendent, have been experimenting with a view of extracting the silver from the zinc-bearing ores It is said that these experiments have been quite successful, resulting in a saving of 75 % of the silver values, while it is hoped that this be raised to 90 %.

The fifteenth annual convention of the Canadian Electrical Association was held on the 21st, 22nd and 23rd June, in the rooms of the Canadian Society of Civil Engineers, 877 Dorchester Street, Montreal. Some 200 members attended the meeting, which was a most successful one, a very interesting programme having been prepared.

The Mining Congress at Liege, which is being attended by one or two Canadian engineers, including Mr. J. Obalski, Inspector of Mines for the Province of Quebec, will extend from June 25th to July 2nd. A very interesting programme of papers are being prepared, and the Congress should prove of high technical interest.

The appreciation in which Mr. S. W. Gebo, late general manager of the Frank Mines, is held by the Association of Frank was well signified the other day when he was presented with a cabinet containing 129 pieces of silver plate. Mr. Gebo is at present residing at Red Lodge, Montana.

Dr. J. Bonsall Porter left Montreal during the month on an extensive tour to Great Britain, whence, later on, he will journey to South Africa as the Canadian representative at the meeting of the Royal Association, which is to attend the opening of the railway to the Victoria Falls.

Mr. John Morris, formerly a Kootenay mine manager, was recently seriously injured by an explosion at the Lenora mine, in the Mount Sicker district, Vancouver Island, his skull being badly fractured, while other terrible injuries were inflicted.

Mr. J. F. Povah, for many years chief Accountant in the office of the Hall Mining & Smelting Co., Nelson, resigned that position to accept an appointment with the International Coal & Coke Co., at Coleman, Alberta.

The new and important portfolio of Lands and Mines in the Ontario Government has been assumed by the Hon. Frank Cochrane, of Sudbury, who was recently elected by acclamation in East Nipissing.

Mr. S. C. H. Miner, who is largely interested in the Granby mines, left Montreal on the 22nd of June on his annual visit of inspection of the company's properties in the Boundary district.

Mr. A. H. Kelly, president and managing director of the Reliance Mining Co., of Nelson, B.C., has returned to his duties after a month's holiday spent at Fredericton Junction, N.B.

Mr. C. J. Coll, of the Acadia Coal Company, Stellarton N.S., has returned to Canada, after an absence of two months in England.

Mr. W. Yolen Williams, formerly superintendent of the Granby Mines, has returned to the west after spending ten months in Europe.

The ninth annual session of the School of Science for the Atlantic provinces, will be held at Yarmouth from July 11 to 28, 1905.

Mr. George Alexander, of Kaslo, has, we learn, taken over general management of the Ferguson Mines, Limited.

THE AMALGAMATED COPPER CO.

This company, which has been in existence for nearly six years, recently issued a First Report, showing at the end of April of the present year cash assets in hand of $2,756,758.83, and surplus in reserve amounting to $8,942,712.30. The capital outstanding is $153,887,900.

COMPANY NOTES.

Montreal & Boston Consolidated.—The new directors of the Mont- & Boston Consolidated Mining & Smelting Co. has issued a circular announcing the sale of its mines and properties to the Dominion Copper Co., and that the last-named company is about to make an issue of bonds to discharge the past debts of the Montreal & Boston and to conduct developments and improvements. The circular states that the principal and most available properties of the Montreal & Boston Co. are not paid for, and that owing to the inability to market the stock, the company was threatened with the loss of these properties, on which it owes over $320,000. An arrangement was accordingly made with the Dominion Copper Co., from which the Montreal & Boston had acquired its principal properties, only part of which were paid for, by which the Dominion company takes over all the properties and issues its stock, share for share, in exchange for Montreal & Boston stock, without assessment or payment of any kind. The Dominion company has authorized an issue of $1,000,000 bonds, of which $700,000 are now to be issued at 90, with a bonus of 200 % of its stock. The moneys realized from the sale of these bonds are to be used to pay the balance of the unpaid purchase price on Montreal & Boston properties and for further working capital to develop the mines and complete the smelters. The right to subscribe to these bonds is reserved to Montreal & Boston stockholders, but they are under no obligation to subscribe. The bond issue has been fully underwritten.

It is understood that Mr. Samuel Newhouse and his associates (including Mr. Samuel Untermyer and others who are interested with him in the Cactus mine and were interested in the Utah Consolidated and other successful mining properties) have consented to organize the work on the Montreal & Boston properties on a business basis. Mr. M. Johnson, superintendent at the Cactus, has gone to British Columbia with a force of new men to take charge. The smelter to be completed to its full capacity of 1,500 tons per day and a converter is to be erected in connection with the smelter. The total capital of the new Dominion company will be $3,200,000, divided into shares of a par value of $1, which is about one-half the total par value of the old Montreal & Boston capital.

Dominion Coal Co.—The secretary of the Boston Stock Exchange has issued the notice that $2,433,000 Dominion Coal Co., Ltd., first mortgage 6 % bonds, due 1913, more than a majority having been deposited under the terms of the company's circular, dated April 17, 1905, have been stricken from the list.

Interim certificates issued by the New England Trust Co., of Boston, and also those issued by the Royal Trust Co., of Montreal, Canada (when stamped by the City Trust Co., of Boston, at transfer agents) for Dominion Coal Co., Ltd., first mortgage 35-year 5 % sinking fund gold bonds, due 1940, of a total issue of $7,000,000, are admitted for quotation on the unlisted sheet and will constitute a good delivery.

The Dominion Coal Co., Limited, 8 % preferred stock, 30,000 shares, have also been stricken from the list.

Interim certificates of Dominion Coal Co., Limited, for 7 % preferred stock, transfer agent American Loan & Trust Co., and registrar the New England Trust Co., of Boston, are admitted for quotation on the unlisted sheet, and will constitute a good delivery.

Dominion Steel.—It is generally believed that the preferred stock of this company will shortly be on a dividend basis. The reorganization plan is now in progress, and it is understood that the preferred shareholders will now be asked to accept the full 3½ % dividend for the current half year, and instead of getting the 14 % dividends in full, which is due them under the accumulation clause, agree to have the preferred put on an 8 % basis, which means that they will in future get their regular dividend and have the back payments made to them at the rate of 1 % a year. The steel rail mill is now running time and a director estimates that the rail mill the first year will show the company a clear profit of $600,000.

Tyee Copper.—April Return.—"Smelter ran 16 days during the month, and smelted, Tyee ore, 3,224 tons; Customs ore, 187 tons—3,511 tons. Matte produced from same, 316 tons. Gross value of contents (copper, silver and gold), after deducting costs of refining and purchase of Customs ore, $47,106." (Office note—The general manager reports that the partial cave (to which your attention was called in the circular dated the 10th March last) has been cleared and opened, and ore is now being won from the stopes which were temporarily closed, but under the conditions created by the partial cave the output of the mine will remain for the present at about 2,000 tons per month, to which it was restricted.)

Standard Explosives Co.—This company was recently incorporated for the manufacture of explosives, at Beaconsfield, near Montreal. At a meeting held during June, at the company's offices, Board of Trade Building, the following directors were elected:—Messrs. W. T. Rodden, J. F. Johnson, S. H. C. Miner, Jas W. Woods, and Chas. W. Dimick At the directors' meeting, held subsequently, Mr W. T. Rodden was elected president and managing director, and Mr. J. F. Johnson, superintendent of the company's works, was appointed secretary-treasurer.

Ymir.—April Return.—"35 stamps ran 27 days and crushed 2,100 tons (2,000 lbs.) of ore, producing 480 ozs. bullion. The estimated realizable value (gross) of the product is $5,250; 145 tons of concentrates shipped, gross estimated value, $3,250 · cyanide plant treated 1,700 tons (2,000 lbs.) of tailings, producing bullion having estimated gross value of $1,150; sundry revenue, $100—$9,750. Working expenses, $10,640. Loss, $890."

Cariboo Consolidated.—A circular, dated 13th inst., has been issued to the shareholders communicating letters and cablegrams from the resident manager. The regular pay gravel of the deep channel has been reached and good gold values have been obtained. A cable, dated May 2nd, reported pumping two million gallons per diem, which on May 5th was reduced to 900,000 gallons. The outlook is reported as "highly encouraging."

Le Roi.—The cable report for May states:—"Shipped from the mine to Northport during the past month, 9,220 tons of ore, containing 3,344 ozs. of gold, 3,550 ozs. of silver, and 198,100 lbs. copper; estimated profit on this ore, after deducting cost of mining, smelting, realisation, and depreciation, $10,500; expenditure on development work during the month, $8,900; development of the mine is being pushed; have nothing special to report."

Le Roi.—Cable from Rossland states:—"Shipped from the mine to Northport during the past month 9,671 tons of ore, containing 4,000 ozs of gold, 4,100 ozs. of silver, 206,600 lbs of copper. Estimated profit on this ore, after deducting cost of mining, smelting, realization and depreciation, $21,000. Expenditure on development work during the month, $5,500. Development of the mine continues to be satisfactory."

Le Roi No. 2.—The May report states:—"Shipped to Greenwood, 142 tons. The net receipts from Greenwood are $19,888, being preliminary payment for 634 tons shipped, $6,315 being deferred payment on 1,885 tons previously shipped. Shipped to Trail, 404 tons. The net receipts from Trail are $8,364, being payment for 83 tons concentrates shipped. Total receipts from both smelters, $34,567."

Le Roi No. 2.—The cable report for May states:—"Shipped to Trail 440 tons. The net receipts from Trail are $15,807, being payment for 734 tons shipped and $1,872, being payment for 30 tons concentrates shipped. The net receipts from Greenwood are $5,448, being deferred payment on 1,844 tons previously shipped. Total receipts from both smelters, $24,127."

Le Roi No. 2.—Mine manager's report for the month of April:—"Josie mine: Output—16 cars of ore were shipped: a total of 548 tons. Of these, 144 tons went to the B.C.C. Company at Greenwood, and 404 tons to Trail. Of the latter, 65.89 tons consisted of ore taken from the fines dump, and assayed 0.41 oz. gold, 1.3 oz. silver, and 2.3 per cent. copper.

Caribco Consolidated.—The following cablegram has been received from the manager: "The water in the shaft stands at—just below the top of old workings—at an elevation of 627 ft.—have recommenced driving East crosscut; everything looks most favourable; we are now pumping 900,000 gallons of water per 24 hours."

On June 2nd, the resident engineer telegraphed: "Pleased to inform you that have already commenced to breast out in the gravel part of Block A—gravel in good condition to work—will send result as soon as possible—No. 2 east crosscut is now in 130 ft."

Slough Creek Gravel Gold.—The manager, writing under date May 5th, states:—"There is splendid gravel in working No. 5, but too much water to save much gold. I expect to have the gravel in the face of working No. 4 soon."

The Fraser River Gold Dredging Company.—The offices of this company have been transferred to No. 39 Lombard Street, E.C.

COMPANY MEETINGS.

Tilt Cove Copper, Nfld.—The report of this company for 1904 shows a credit balance of £13,405. The Cape Copper Company's Tilt Cove establishment accounts for the year show that the mines made a gross profit of £36,097, leaving, after charging the account with interest and discount payable to the Cape Copper Company, the rent (representing the interest on the company's debentures), prospecting costs, management, etc., a net profit of £29,663. The balance of profit thus remaining has been dealt with as follows:—£14,831 has been retained by the Cape Copper Company, and £14,831 has been received by this company as its moiety of profit, as provided for by the agreement between this company and the Cape Copper Company. Although a profit of £29,663 is shown on the establishment account, that result is arrived at after the absorption of £314, profits spent on plant and machinery, and additions to buildings, less £11 released from the amount retained for working capital, and the net figure—namely £303—has been added to the capital expenditure on the one side of the account, and to the reserve for depreciation on the other, as heretofore. Out of the available profit of £14,766, the committee have already declared an interim dividend of 1s. per share, and they now recommend a final dividend of 2s. per share, making a total distribution of 3s. per share, or 7½ per cent. for the year, leaving £1,416 to be carried forward.

Vermilion Forks Mining Development Co.—The ordinary general meeting of this company, which owns property at Princeton, in the Similkameen district, was held in London last month. The chairman stated that during the year the expenditure had only amounted to £1,436, as follows:—

Development work	£284
Salaries	493
General expenses	402
Government fees and legal expenses	113
Printing, cables, etc.	144

The company has proved the existence of coal by drilling on one of its leases near Princeton, but on the other lease explorations have been disappointing. The company are basing great expectations on the construction of a railway into the district. The chairman, in the course of his address, stated that £1,500 would be required to meet the necessities of the year and pay off the bank advance. The report and accounts were adopted

Asbestos and Asbestic Company.—The directors' report for 1904 states that the business for the said period has resulted in a net profit of £443, as against a net loss of £1,060 for the previous nine months. The production of asbestos for the past year has been the largest on record since the formation of the company. The new mill and equipment have justified the cost of their installation, and it is proposed to still further add to the plant, to enable the company to keep pace with the increasing demand. The profit on actual trading during the past year was £9,523, as against £6,703 for the previous nine months, showing on the average of twelve months an increase of about £600. An important item against the year's profits is the interest on loans and bonds, amounting to £2,697. General expenditure has been less both in London and Danville, and the directors have not drawn or charged any fees for the year.

Alberta Coal Co.—The annual general meeting of this company was held at Nelson last month, Mr. W. Blakemore, presiding. The directors reported that negotiations with the Imperial Coal Company, of Montreal, for the development of the property, had failed to materialize. The necessary payments to the Government for the protection of the Company's title, have been made. The following directors were elected for the ensuing year:—C. W. Busk, J. A. Turner, W. A. Jowett, J. Schirmear and A. O. Applequist. Mr. Byron Sharp was appointed auditor.

Beatrice Mines.—The annual general meeting of the Beatrice Mines, Limited, was held recently at Revelstoke, B.C. A financial statement was presented, showing the company's finances to be in a satisfactory condition. The following directors were elected:—Mr. G. S. McCarter, president; Mr. J. A. Stone, vice-president. Mr. F. Fulmer, manager; Mrs. M. Anderson and Mr. C. Holten. Mr. H. Y. Anderson was appointed secretary-treasurer. The company is now shipping ore taken out during the winter, from Camborne to the smelter.

Tabor Coal Co.—The first annual meeting of the Tabor Coal Mining Co. was held at Winnipeg on May 26. The following directors were elected: Messrs. J. S. Hough, D. C. Adams, J. W. Bettes, Isaac Cockburn and George Rogers, of Winnipeg; L. M. Johnston and H. E. Cherry, of Lethbridge. The directors elected Mr. J. S. Hough, president; Mr. Isaac Cockburn, vice-president; and Mr. D. E. Adams, secretary-treasurer. The company is already shipping coal, and is installing sufficient machinery to produce 1,000 tons daily.

Rambler-Cariboo Mines, Limited.—The annual meeting of the above company was held in Kaslo, B.C., last month, the following board of directors being re-elected; Mr. M. McClaine, Dr. J. Armstrong, Tacoma; Mr. P. W. Lawrence, Pullman; Mr. Alfred Colliidge, Spokane; Mr. J. D. Chaplin, St. Catharines, Ont.; Mr. Harry Cornwell, Hartford, Conn.; Mr. B. W. McPhee, Colfax; Mr. W. E. Zwicky, Kaslo. Mr. Zwicky was also elected secretary-treasurer and general manager.

FOREIGN CONSUMPTION OF COPPER.

Mr. L. Vogelstein, representing in America Aaron, Hirsch & Sohn, of Halberstadt, Germany, reports to the Canadian Mining Review that the German consumption of foreign copper for the months from January to April, 1905, inclusive, was as follows:—

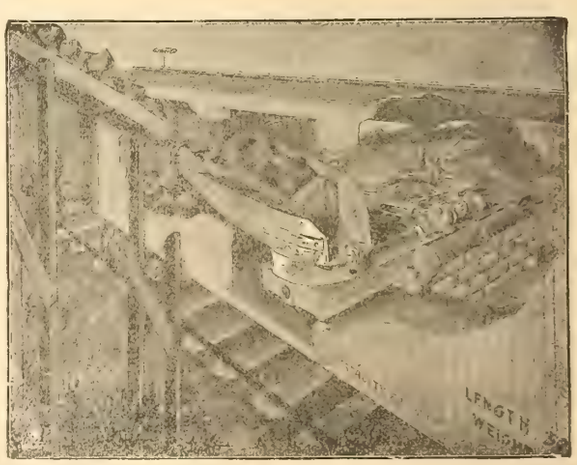
	1905.	1904.	1903.
Imports	32,172 tons	40,859 tons	27,260 tons
Exports	4,413 tons	2,651 tons	3,833 tons
	27,759 tons	38,208 tons	23,427 tons

Out of the above, 26,720 tons were imported from the United States.

THE OTTUMWA BOX CAR LOADER.

The illustration below shows the Ottumwa Loader of the dock pattern as installed at the Canadian Pacific Railway Company's docks, Fort William, Ont. This loader has been in successful use there about two years, and is giving excellent satisfaction. Similar loaders are in use at West Superior, Wis., U.S.A., and at Lake Erie Coal Co.'s docks, Walkerville, Ont. One is now being installed for George Hall Coal Co., at Prescott, Ont., and one at the wharf of the Dominion Coal Co., Montreal.

These dock loaders not only greatly reduce the expense of loading coal in box-cars, but increase the loading capacity, and load the coal in better condition. The machines are also quite extensively used for moving loaded cars, thereby increasing the capacity of the docks on account of their being able to move cars when there is no switch engine at hand.



Stationary loaders, manufactured by the same company, are in use by the Souris Coal Mining Co., Winnipeg; the Intercolonial Coal Mining Co., of Westville; International Coal & Coke Co., of Coleman, Alta.; the Acadia Coal Co., of Stellarton, N.S.; and Dominion Coal Co., Glace Bay.

These loaders have entirely changed the method of loading box-cars, and it is no longer a hardship to do such loading. The advantages of shipping coal in closed cars can be readily understood by anyone, and is thoroughly appreciated by purchasers of coal, as box-car shipments are protected from loss in transit.

Those of our readers interested in this useful appliance can obtain catalogues and fuller information from the Canadian sales agents, Messrs. W. H. C. Mussen & Co., of Montreal.

TWO GOOD OPENINGS.

Enquiry has reached the Mining Review office whether we can recommend:

(1) A man thoroughly conversant with economic methods of mining and packing mica for the European market, who would go to South Africa on a three years' engagement.

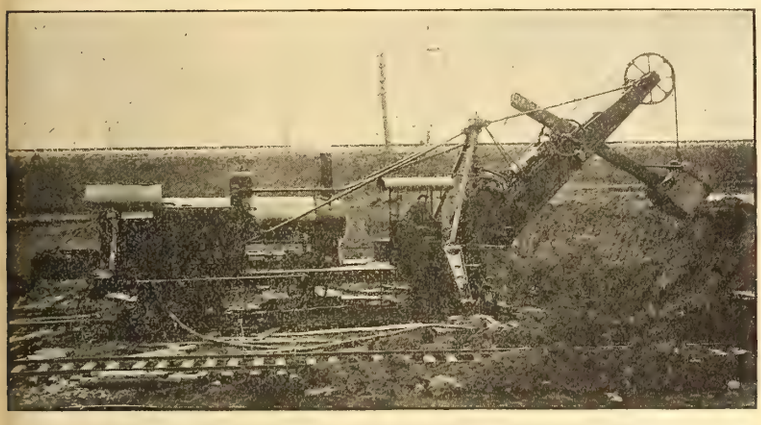
(2) A qualified practical miner to take charge of a high-grade silver mine in Ontario, as mine captain.

Applications may be addressed to the Editor of the Canadian Mining Review, 171 St. James Street, Montreal.

INDUSTRIAL NOTES.

The Canadian Pacific Railway has just purchased four powerful steam shovels from the Locomotive & Machine Co., of Montreal, Limited. These machines are of the new Robinson wire-rope type, designed by Mr. A. W. Robinson, of 14 Phillips Square, Montreal. The first machine was placed in service some weeks ago, on trial, at Montreal Junction, and on the strength of its successful performance, the company, through Mr. W. R. Baker, has ordered three more. It has been subjected to most exhaustive tests, and on comparing its performance with that of a Bucyrus shovel, on the same work, it was found to have excavated fifty per cent. more material in the same working time, and to have consumed only three-fourths of the fuel. Mr. Robinson is also the designer of the Bucyrus machine, which is so well and favorably known, about a thousand of them being in service; but in this latest production he has made a most remarkable advance in speed, power and efficiency. Some idea of the power of this machine may be gained from the fact that it can dig a cutting 60 feet wide and 25 feet deep at one time, loading the material on a train of cars alongside. It loads standard cars, 34 feet long, in 1¾ minutes each, scooping up five tons at a time with its immense steel dipper. Although so large and powerful, it is handled with greater ease and rapidity than the old style, and seems almost human in its motions. It is a matter of satisfaction that these machines are now built in Canada, as heretofore they have all been imported from the United States. Not only that, but this Canadian design is being largely used in the United States, where it is being introduced by the American Locomotive Company, and bids fair to supersede the old style by reason of its superior speed and efficiency.

One of these shovels has also been sold to the Canada Copper Company, for digging heavy ore.



At a meeting of the board of directors of the Westinghouse Electric and Manufacturing Company, held in New York last month, Mr. E. M. Herr was elected first vice-president and chief executive officer under the president. The advent of heavy electric traction and the adoption of electricity by main line railways render the services of a man skilled not only in manufacture, but also conversant with railroad operations, especially desirable at this time. Mr. Herr was locomotive superintendent of the Northern Pacific Railway for a number of years, and previous to that had many years' experience in various positions on important railways in the west. For the last seven years he has been vice-president and general manager of the Westinghouse Air Brake Company.

The Westinghouse Electric & Manufacturing Company has now four vice-presidents, namely, Messrs. E. M. Herr, Frank H. Taylor, L. A. Osborne and Newcomb Carlton, which makes an especially able and efficient force of officials. It is said that the works at East Pittsburg have never in the history of the company been so busy with the construction of electric railway apparatus than at present. This is due to the fact that nearly all the larger trunk lines are now ready to adopt electric power, since the Westinghouse alternating current single phase system has proved itself such a signal success in practical demonstrations.

The interests of the Ingersoll-Sergeant and the Rand Drill Companies were recently amalgamated, and a new corporation, the Ingersoll-Rand Company, formed under the laws of New Jersey, with a capital of $10,000,000, of which $5,000,000 is preferred stock and the balance common. This is a union of valuable patents and of expert engineers of large experience in this special line of work. It should be advantageous to purchaser as well as manufacturer, as improved machinery and better service will result. The factories of the two companies are located at Phillipsburg, N.J.; Easton, Pa.; Tarrytown, N.Y.; Ossining, N.Y.. Painted Post, N.Y.; 34th Street, New York City; and Sherbrooke, Quebec. The officers of the Ingersoll-Rand Company are as follows:—President, Mr W. L. Saunders, formerly president of the Ingersoll-Sergeant Drill Company; first vice-president, Mr. Geo. Doubleday, formerly treasurer of the Ingersoll-Sergeant Drill Company. Vice-presidents: Mr. Jaspar R. Rand, formerly president of the Rand Drill Company; Mr. John A. McCall, president of the New York Life Insurance Company; Mr. J. P. Grace, vice-president of W. R. Grace & Co.; Mr. Geo. R. Elder, general manager of the manufacturing department. Treasurer, Mr. W. R. Grade, formerly secretary of the Ingersoll-Sergeant Drill Company; secretary, Mr. F. A. Brainerd, formerly treasurer of the Rand Drill Company. For the present, the main offices of the new company will be at 26 Cortland Street, New York.

The Abner Doble Company, of San Francisco, announces that arrangements have been made with the John McDougall Caledonian Iron Works Company, Limited, of Montreal, whereby the latter become sole licensees for the manufacture of the Doble system of water-wheels in Canada. The tangential water-wheels and needle-regulating nozzles, manufactured by the Abner Doble Company, are well known for their excellence of design and workmanship, and considerable engineering interest has recently been shown in relation to the four 8,000 h.p. wheels, which that company has built for operation in California power plants. The McDougall Company have a most extensive machine works, their plant including machine shops, pattern shop, foundry, forging works, and structural material shop. Their plant is, therefore, well equipped for the manufacture of water wheels and other hydraulic machinery. They already have in hand the building of a 100-h.p. wheel to operate under 170 ft. head taking water through a 3½ in. jet and having a speed of 130 revolutions per minute. The Canadian licensees are prepared to furnish the steel pipe, structural work and all machinery necessary for complete power plant.

The Elwood Tin Workers' Gold Mining Co., of Lardeau, B.C., has ordered from the Allis-Chalmers-Bullock, Limited, Montreal, a compound, duplex, power-driven Ingersoll Sergeant Air Compressor with piston inlet valves. The cylinders are 12¼ and 20¼ by 14-in. stroke, the machine travelling at 130 revolutions per minute. Mounted directly on the shaft of the compressor is a double water wheel, designed by the Doble Engineering Co., of San Francisco, which will develop 90-h.p. under the head of 170 ft. afforded by this stream. The wheel is equipped with a patent needle nozzle fitted with hand control. The compressor will deliver 625 cub. ft. of free air per minute. This system of mounting a water-wheel directly on the compressor is an ideal way of generating power, as the loss by friction is very slight and all gearing, shafting, etc., is rendered unnecessary. In addition to the compressor, Allis-Chalmers-Bullock, Limited, supplied a complete outfit of drills, air receivers, columns, tripods, hose and mining sundries.

Work has already commenced on the new factories of the Canadian Rubber Company, of Montreal, Papineau Avenue and Notre Dame Street. A new roof and many other improvements are being added to the existing plant. All the contemplated improvements, it is anticipated, will be completed within eighteen months, and as the present management have a reputation for doing big things quickly and thoroughly, no doubt this time limit will not be exceeded. The extension of the manufacturing facilities will make it possible to add very largely to the present force of work-people employed.

The Dominion Iron & Steel Company's new hydraulic engine, and a portion of the machinery of the new steel rail mill, was tested during the month, and found to work satisfactorily. It is expected that the entire equipment of the mill will have been adjusted and in readiness for operation before the beginning of July. The cooling mill is meanwhile completed.

The Alberta Railway & Irrigation Company, of Lethbridge, has ordered a 175 horse-power Robb-Mumford boiler from the Robb Engineering Company. This makes eight boilers of this type purchased during the past few years by this undertaking.

The installation of the new aid compressor at the Drummond Colliery was recently completed, the engines having been manufactured by Messrs. Walker Bros., Limited, Wigan, England.

The contract has been awarded the Canadian General Electric Company for furnishing two 30-kilowatt generators with switchboard and general supplies for the Western Fuel Company of Nanaimo, B.C.

A new 90 h.p. boiler has been installed at the Providence Mine, near Greenwood, for the purpose of supplying power for hoisting and steam drilling.

The White Bear Mine, at Rossland, has ordered a 400 h.p. motor, which will be installed at the mine on the 15th of July.

DIGEST OF RECENT PATENTS: MINING AND METALLURGICAL.

(Specially Reported for The Canadian Mining Review.)

CANADIAN.

May 9, 1905.

789,134.—Copper-pouring Spoon and Splash Shield. Ralph Baggaley, Pittsburg, Pa. Casting apparatus comprising a spoon open throughout its length, having converging trough-shaped sides and a pouring-lip mounted in nearly vertical position between a converter and the molds.

789,371.—Ore Roaster. John W. R. Laxton, Lynn, Mass. In an ore-roasting apparatus, a hollow drum revoluble on a horizontal axis and having a series of pockets in its periphery; each pocket being formed with one side continuous with one side wall of said drum, but with a space between the opposite side and the other side wall of the drum, the remaining wall of each pocket being one continuous curve with its axis parallel with the axis of the drum, and a tubular passage being formed through each pocket parallel with its said curved wall but farther from the bottom of the pocket than from the curved surfaces more removed from said bottom.

789,648.—Method of Continuously Producing Matte by Dissolving Ores. Ralph Baggaley, Pittsburg, Pa. A method which consists in forming a bath of molten matte, blowing air thereinto, and adding thereto, from time to time, solid charges of ore, rich in fuel value and low in silica and other solid charges of ore rich in silica.

789,523.—Process of Electrolytically Refining Copper-Nickel Alloys. Anson G. Betts, Troy, N.Y. A process which consists in dissolving the alloy as anode in a solution containing copper salts, for the electro deposition of metallic copper and production of a solution of nickel salt, preparing a nickel-sulfate solution therefrom, electrolyzing the nickel-sulfate solution with a suitable cathode and with a spongy lead anode for the electro deposition of metallic nickel, and production of lead sulfate, and reducing the lead sulfate formed to metallic lead by electrolysis as a cathode in a solution containing the sulfuric-acid radical.

789,160.—Apparatus for Feeding and Distributing Molten Material in Blasting Furnaces. Edward W. Lindquist, Chicago, Ills., assignor to Ralph Baggaley, Pittsburg, Pa. An apparatus comprising a vessel extending along the furnace, supported by a metal cradle carried on cast-metal trunnions, means for revolving it in either direction and for completely inverting it when necessary.

789,440.—Process of Treating Phosphate Rock and Producing Phosphorous Chlorids and Alkali-Metal Cyanids. Florentine J. Machalske, Brooklyn, N.Y., assignor to Frederick Darlington, Great Barrington, Mass. A process which consists in mixing the rock with with an alkali-metal chlorid and carbon, smelting the mixture at a high temperature in the presence of nitrogen, and smelting the resulting cyanamids with an alkali-metal carbonate.

May 16, 1905.

789,796.—Automatic Fuel Feeding Device. William H. Cooke, Rochester, N.Y., assignor to Susan V. Cooke, Rochester, N.Y. The combination with a fuel-supply, of a spout to discharge fuel upon the grates; means for conveying fuel from said supply to said spout; and means for automatically oscillating the discharge end of the spout at angles with both the horizontal and vertical planes.

790,238.—Method of Recovering Copper from its Ores. Henry M. Wilcox, Chicago, Ill., assignor to Esmeralda Copper Precipitating Company, Chicago, Ill., a corporation. A process which consists in leaching the ore with suitable reagent to form cupric-sulfate solution, dosing the solution with sulfur dioxid, and thereafter, in a closed vessel having proper vacant space left therein, subjecting said solution to heat and pressure, suited for precipitation, of the copper in metallic form while the sulfur dioxid is free to escape from the liquid into the confined space in such vessel provided, to perfect the reaction.

790,000.—Amalgamator. Joseph J. Peacock, Chicago, Ill. The combination with a suitable sluice provided with a well having imperforate end walls, of a cylinder rotatably mounted in bearings inside said end walls and dipping into the well, said cylinder being positively restrained by its bearings against rising.

790,156.—Ore Concentrator.—William M. Reely, Missoula, Mont. A concentrating apparatus involving a reciprocatory and vertically adjustable inclined table provided with a series of pans, a series of sluiceways arranged at one side of and communicating with said pans, and a pair of sluiceways arranged over said table and communicating with a plurality of the pans at one end of said series of pans, combined with means for feeding the material to be concentrated to the pans independent of said plurality of pans, and means for transferring the material conveyed by certain of the sluiceways of said series of sluiceways to the said plurality of sluiceways.

May 23, 1905.

790,391.—Process of Smelting Metallic Compounds. Edgar F. Price, Niagara Falls, N.Y. A process which consists in establishing an electric arc within the charge, surrounding the zone of reduction and protecting the electrodes from the oxidizing and cooling effect of the atmosphere by a considerable body of the charge, and maintaining between the electrodes the minimum potential difference requisite to effect reduction, thereby substantially preventing loss of electric current by leakage through the charge and heat radiation.

790,342.—Concentrator. Harry H. Campbell, Steelton, Pa. The combination of the table, the series of magnets arranged adjacent thereto in a row extending from near one corner of the table to near the diagonally opposite corner thereof, means for reciprocating said magnets transversely to said table, and means for magnetizing and demagnetizing said magnets at predetermined times, and means for tending to carry the material in the direction transverse to that of the magnet series.

790,429.—Process of Recovering Metals and Oxides from Solutions. Adolf Guttensohn, Southend, England. A process which consists in mixing the solution containing said metallic bodies with a solution composed of an alkali and resin, separating the liquid from the coagulated mass and then retorting the latter to drive off the resin.

790,394.—Process of Smelting Refractory Ores. Edward F. Price, Niagara Falls, N.Y. A process which consists in interposing a charge of the ore and a reducing agent as a resistance-conductor between electrodes, one of said electrodes being of metal and comprising a liquid portion and a solid portion, electrically heating said charge to the temperature requiste for reduction, and cooling the solid portion of said metal electrode.

790,586.—Automatic Revolving Car-Dump. Arthur Moore, War Eagle, W. Va. A device having a plurality of circular members rigidly mounted upon a common axis and a platform rigidly secured within such circular members, in combination with two railroad-tracks secured one on each side of and adjacent to the axis and having the individual rails of each track on opposite sides of but unequally distant from said axis.

790,811.—Conveyer. Benjamin H. Alvery, Louisville, Ky., assignor to The Alvey-Ferguson Company, Louisville, Ky., a Corporation of Kentucky. An elevator comprising a frame having approximately horizontal end portions and its intermediate part arranged at an inclination with its said end portions and gradually merging into the same, rollers constituting a portion of the track or way, a stationary portion arranged at the junction of an end and intermediate portion of the frame, and travelling means for conducting the articles upward along said track or way.

May 31, 1905.

790,922.—Apparatus for obtaining Oxides of Alkaline Metals. Charles W. Roepper, Philadelphia, Pa., and Willis E. Harmon, Mechanic Falls, Me., assignors to American Electrolytic Company, a Corporation of Delaware. An apparatus for the practice of mercurial alkaline process, a transferring-wheel for effecting circulation of the mercury, formed of electrically-conductive material, and provided with pockets for carrying the mercury and also for increasing the extent of the discharging-surface in contact with the amalgams.

791,341.—Electrolytic, Deposition of Metals. Herbert C. Harrison, London, and Joseph Day, Weston-super-Mare, England, assignors to said Herbert C. Harrison. A process which consists in causing the electrolyte to impinge all around upon a vertically-mounted cylindrical cathode, by directing continually against every part of and all around the surface of said cathode and throughout the length thereof during deposition, a series of jets of electrolyte arranged certain distances apart around said cathode, whereby the rapid and continuous change of the electrolyte immediately contiguous to and all around the surface of the cathode and throughout the length thereof is effected.

790,913.—Mineral Reclaimer and Saver.—Homer L. Orr and Fred. B. Finley, Fort Collins, Colo. In an apparatus, a tank divided into a plurality of compartments of different sizes, a screen arranged in the larger compartments, a trough arranged below the screen, a plurality of compartments each containing a filtering medium and means for supplying oil and water to the compartments, and means for causing the liquids to traverse a tortuous path therethrough.

791,090.—Process of Extracting Nickel from Nickel-Bearing Substances. Hans A. Frasch, New York, N.Y. A process consisting in pulverizing the matte, adding to it sulfuric acid and flowers of sulfur, and subjecting the mixture to the action of heat.

791,305.—Art of Separating Gold or other Diamagnetic Metals. Louis T. Weiss, New York, N.Y. A process which consists in first coating with magnetic metal by electrolysis such diamagnetic particles, and then separating such coated metallic particles from the accompanying matter by magnetic means.

791,175.—Conveyer. Clarence K. Baldwin and Lincoln Moss, New York, N. Y., assignors to Robins Conveying Belt Company, New York, N.Y., a Corporation of New Jersey. The combination of a main conveyer and a plurality of secondary conveyers disposed at an angle thereto, the main conveyer and secondary conveyers being relatively adjustable, and operative means whereby material may be removed from or delivered to said main conveyers by means of the secondary conveyers.

June 6, 1905.

791,577.—Process of Smelting Ore.—Elfego Piveroll, Los Angeles, Cal. A process which consists of subjecting part of the ore to the product of an imperfect combustion; thereby depositing carbon on that ore, and at the same time subjecting that ore to a monoxide gas, and deoxidizing that ore, and at the same time subjecting a previously-deoxidized portion of the ore to a smelting heat, the monoxide gas being formed when subjecting the ore with carbon to the smelting heat.

791,799.—Ore Briquet. William A. Koneman, Chicago, Ill. A method which consists in mixing together in suitable proportions ore-fines and finely-divided uncoked bituminous coal and anthracite coals, adding to the mixture a binding agent, forming the mass into briquets and drying the same without coking, whereby to provide briquets of mixed ore and fuel for subsequent coking by the direct heat of the blast-furnace.

791,928.—Process of Treating Ferruginous Ore for the Manufacture of Iron and Steel therefrom.—Montague Moore, Melbourne, and Thomas J. Heskett, Brunswick, Victoria, Australia. A process which consists in suitably concentrating and separating the material, then subjecting the concentrated and separated material in a finely-divided state while passing in a continuous stream to such temperature as to bring the material to a red heat, then subjecting the heated material in a finely-divided state while passing in a continuous stream to a suitable gas so as to convert the material into metallic particles without coming into contact with an oxidizing atmosphere, and then fusing and balling up the metallic particles without coming into contact with an oxidizing atmosphere.

PROVINCE OF QUEBEC

The attention of Miners and Capitalists in the United States and in Europe is invited to the

GREAT MINERAL TERRITORY

Open for investment in the Province of Quebec.

Gold, Silver, Copper, Iron, Asbestos, Mica, Plumbago, Phosphate, Chromic Iron, Galena, Etc.

ORNAMENTAL AND STRUCTURAL MATERIALS IN ABUNDANT VARIETY.

The Mining Law gives absolute security to Title, and has been specially framed for the encouragement of Mining.

Mining concessions are divided into three classes :—

1. In unsurveyed territory (*a*) the first class contains 400 acres, (*b*) the second, 200 acres, and (*c*) the third, 100 acres.

2. In surveyed townships the three classes respectively comprise one, two and four lots.

All lands supposed to contain mines or ores belonging to the Crown may be acquired from the Commissioner of Colonization and Mines (*a*) as a mining concession by purchase, or (*b*) be occupied and worked under a mining license.

No sale of mining concessions containing more than 400 acres in superficies can be made by the Commissioner to the same person. The Governor-in-Council may, however, grant a larger extent of territory up to 1,000 acres under special circumstances.

The rates charged and to be paid in full at the time of the purchase are $5 and $10 per acre for mining lands containing the superior metals* ; the first named price being for lands situated more than 12 miles and the last named for lands situated less than 12 miles from the railway.

If containing the inferior metal, $2 and $4 according to distance from railway.

Unless stipulated to the contrary in the letters patent in concessions for the mining of superior metals, the purchaser has the right to mine for all metals found therein ; in concessions for the mining of the inferior metals, those only may be mined for.

*The superior metals include the ores of gold, silver, lead, copper, nickel, graphite, asbestos, mica, and phosphate of lime. The words inferior metals include all other minerals, and ores.

Mining lands are sold on the express condition that the purchaser shall commence *bona fide* to mine within two years from the date of purchase, and shall not spend less than $500 if mining for the superior metals ; and not less than $200 if for inferior metals. In default, cancellation of sale of mining lands

(*b*) Licenses may be obtained from the Commissioner on the following terms :—Application for an exploration and prospecting license, if the mine is on private land, $2 for every 100 acres or fraction of 100 ; if the mine is on Crown lands (1) in surveyed territory, $5 for every 100 acres, and (2) in unsurveyed territory, $5 for each square mile, the license to be valid for three months and renewable. The holder of such license may afterwards purchase the mine, paying the prices mentioned.

Licenses for mining are of two kinds: Private lands licenses where the mining rights belong to the Crown, and public lands licenses. These licenses are granted on payment of a fee of $5 and an annual rental of $1 per acre. Each license is granted for 200 acres or less, but not for more ; is valid for one year, and is renewable on the same terms as those on which it was originally granted. The Governor-in-Council may at any time require the payment of the royalty in lieu of fees for a mining license and the annual rental—such royalties, unless otherwise determined by letters patent or other title from the Crown, being fixed at a rate not to exceed three per cent. of the value at the mine of the mineral extracted after deducting the cost of mining it.

The fullest information will be cheerfully given on application to

THE MINISTER OF LANDS, MINES AND FISHERIES,
PARLIAMENT BUILDINGS, QUEBEC.

Ontario's Mining Lands..

THE Crown domain of the Province of Ontario contains an area of over 100,000,000 acres, a large part of which is comprised in geological formations known to carry valuable minerals and extending northward from the great lakes and westward from the Ottawa river to the Manitoba boundary.

Iron in large bodies of magnetite and hematite: copper in sulphide and native form; gold, mostly in free milling quartz; silver, native and sulphides; zincblende, galena, pyrites, mica, graphite, talc, marl, brick clay, building stones of all kinds and other useful minerals have been found in many places, and are being worked at the present time.

In the famous Sudbury region Ontario possesses one of the two sources of the world's supply of nickel, and the known deposits of this metal are very large. Recent discoveries of corundum in Eastern Ontario are believed to be the most extensive in existence.

The output of iron, copper and nickel in 1903 was much beyond that of any previous year, and large developments in these industries are now going on.

In the older parts of the Province salt, petroleum and natural gas are important products.

The mining laws of Ontario are liberal, and the prices of mineral lands low. Title by freehold or lease, on working conditions for seven years. There are no royalties.

The climate is unsurpassed, wood and water are plentiful, and in the summer season the prospector can go almost anywhere in a canoe.

The Canadian Pacific Railway runs through the entire mineral belt.

For reports of the Bureau of Mines, maps, mining laws, etc., apply to

HONORABLE E. J. DAVIS,
Commissioner of Crown Lands,

or

THOS. W. GIBSON,
Director Bureau of Mines,
Toronto, Ontario.

Dominion of Canada

SYNOPSIS OF REGULATIONS

For disposal of Minerals on Dominion Lands in Manitoba, the North-west Territories and the Yukon Territory.

COAL.

Coal lands may be purchased at $10 per acre for soft coal and $20 for anthracite. Not more than 320 acres can be acquired by one individual or company. Royalty at the rate of ten cents per ton of 2,000 pounds shall be collected on the gross output.

QUARTZ.

Persons of eighteen years and over and joint stock companies holding free miner's certificates may obtain entry for a mining location.

A free miner's certificate is granted for one or more years, not exceeding five, upon payment in advance of $7.50 per annum for an individual, and from $50 to $100 per annum for a company, according to capital.

A free miner, having discovered mineral in place, may locate a claim 1500 x 1500 feet by marking out the same with two legal posts, bearing location notices, one at each end on the line of the lode or vein.

The claim shall be recorded within 15 days if located within ten miles of a mining recorder's office, one additional day allowed for every additional ten miles or fraction. The fee for recording a claim is $5.

At least $100 must be expended on the claim each year or paid to the mining recorder in lieu thereof. When $500 has been expended or paid, the locator may, upon having a survey made, and upon complying with other requirements, purchase the land at $1.00 an acre.

Permission may be granted by the Minister of the Interior to locate claims containing iron and mica, also copper, in the Yukon Territory of an area not extending 160 acres.

The patent for a mining location shall provide for the payment of a Royalty ot 2½ per cent. of the sales of the products of the location.

PLACER MINING.

Manitoba and the N. W. T., excepting the Yukon Territory.—Placer mining claims generally are 100 feet square; entry fee $5, renewable yearly. On the North Saskatchewan River claims are either bar or bench, the former being 100 feet long and extending between high and low water mark. The latter includes bar diggings, but extends back to the base of the hill or bank, but not exceeding 1,000 feet. Where steam power is used, claims 200 feet wide may be obtained.

Dredging in the rivers of Manitoba and the N. W. T., excepting the Yukon Territory.—A free miner may obtain only two leases of five miles each for a term of twenty years, renewable in the discretion of the Minister of the Interior.

The lessee's right is confined to the submerged bed or bars of the river below low water mark, and subject to the rights of all persons who have, or who may receive entries for bar diggings or bench claims, except on the Saskatchewan River, where the lessee may dredge to high water mark on each alternate leasehold.

The lessee shall have a dredge in operation within one season from the date of the lease for each five miles, but where a person or company has obtained more than one lease one dredge for each fifteen miles or fraction is sufficient. Rental, $10 per annum for each mile of river leased. Royalty at the rate of two and a half per cent. collected on the output after it exceeds $10,000.

DREDGING IN THE YUKON TERRITORY.

Six leases of five miles each may be granted to a free miner for a term of twenty years, also renewable.

The lessee's right is confined to the submerged bed or bars in the river below low water mark, that boundary to be fixed by its position on the 1st day of August in the year of the date of the lease.

The lessee shall have one dredge in operation within two years from the date of the lease, and one dredge for each five miles within six years from such date. Rental, $100 per mile for first year and $10 per mile for each subsequent year. Royalty, same as placer mining.

PLACER MINING IN THE YUKON TERRITORY.

Creek, gulch, river and hill claims shall not exceed 250 feet in length, measured on the base line or general direction of the creek or gulch, the width being from 1,000 to 2,000 feet. All other placer claims shall be 250 feet square.

Claims are marked by two legal posts, one at each end, bearing notices. Entry must be made within ten days, if the claim is within ten miles of mining recorder's office. One extra day allowed for each additional ten miles or fraction.

The person or company staking a claim must hold a free miner's certificate.

The discoverer of a new mine is entitled to a claim of 1,000 feet in length, and if the party consists of two, 1,500 feet altogether, on the output of which no royalty shall be charged, the rest of the party ordinary claims only.

Entry fee, $10. Royalty at the rate of two and one-half per cent. on the value of the gold shipped from the Yukon Territory to be paid to the Comptroller.

No free miner shall receive a grant of more than one mining claim on each separate river, creek or gulch, but the same miner may hold any number of claims by purchase, and free miners may work their claims in partnership by filing notice and paying fee of $2. A claim may be abandoned, and another obtained on the same creek, gulch or river, by giving notice and paying a fee.

Work must be done on a claim each year to the value of at least $200.

A certificate that work has been done must be obtained each year; if not, the claim shall be deemed to be abandoned, and open to occupation and entry by a free miner.

The boundaries of a claim may be defined absolutely by having a survey made and publishing notices in the Yukon Official Gazette.

PETROLEUM.

All unappropriated Dominion Lands in Manitoba, the North-West Territories and within the Yukon Territory are open to prospecting for petroleum, and the Minister may reserve for an individual or company having machinery on the land to be prospected, an area of 640 acres. Should the prospector discover oil in paying quantities, and satisfactorily establish such discovery, an area not exceeding 640 acres, including the oil well and such other land as may be determined, will be sold to the discoverer at the rate of $1.00 an acre subject to royalty at such rate as may be specified by order-in-council.

Department of the Interior,

Ottawa, February, 1904.

W. W. CORY,

Deputy of the Minister of the Interior.

PROVINCE OF NOVA SCOTIA.

Leases for Mines of Gold, Silver, Coal, Iron, Copper, Lead, Tin

—AND—

PRECIOUS STONES.

TITLES GIVEN DIRECT FROM THE CROWN, ROYALTIES AND RENTALS MODERATE.

GOLD AND SILVER.

Under the provisions of Chap. 1, Acts of 1892, of Mines and Minerals, Licenses are issued for prospecting Gold and Silver for a term of twelve months. Mines of Gold and Silver are laid off in areas of 150 by 250 feet, any number of which up to one hundred can be included in one License, provided that the length of the block does not exceed twice its width. The cost is 50 cents per area. Leases of any number of areas are granted for a term of 40 years at $2.00 per area. These leases are forfeitable if not worked, but advantage can be taken of a recent Act by which on payment of 50 cents annually for each area contained in the lease it becomes non-forfeitable if the labor be not performed.

Licenses are issued to owners of quartz crushing mills, who are required to pay Royalty on all the Gold they extract at the rate of two per cent. on smelted Gold valued at $19 an ounce, and on smelted Gold valued at $18 an ounce.

Applications for Licenses or Leases are receivable at the office of the Commissioner of Public Works and Mines each week day from 10 a.m. to 4 p.m., except Saturday, when the hours are from 10 to 1. Licenses are issued in the order of application according to priority. If a person discovers Gold in any part of the Province, he may stake out the boundaries of the areas he desires to obtain, and this gives him one week and twenty-four hours for every 15 miles from Halifax in which to make application at the Department for his ground.

MINES OTHER THAN GOLD AND SILVER.

Licences to search for eighteen months are issued, at a cost of thirty dollars, for minerals other than Gold and Silver, out of which areas can be selected for mining under lease. These leases are for four renewable terms of twenty years each. The cost for the first year is fifty dollars, and an annual rental of thirty dollars secures each lease from liability to forfeiture for non-working.

All rentals are refunded if afterwards the areas are worked and pay royalties. All titles, transfers, etc., of minerals are registered by the Mines Department for a nominal fee, and provision is made for lessees and licensees whereby they can acquire promptly, either by arrangement with the owner or by arbitration, all land required for their mining works.

The Government as a security for the payment of royalties, makes the royalties first lien on the plant and fixtures of the mine.

The unusually generous conditions under which the Government of Nova Scotia grants its minerals have introduced many outside capitalists, who have always stated that the Mining laws of the Province were the best they had had experience of.

The royalties on the remaining minerals are: Copper, four cents on every unit; Lead, two cents upon every unit; Iron, five cents on every ton; Tin and Precious Stones, five per cent.; Coal, 10 cents on every ton sold.

The Gold district of the Province extends along its entire Atlantic coast, and varies in width from 10 to 40 miles, and embraces an area of over three thousand miles, and is traversed by good roads and accessible at all points by water. Coal is known in the Counties of Cumberland, Colchester, Pictou and Antigonish, and at numerous points in the Island of Cape Breton. The ores of Iron, Copper, etc., are met at numerous points, and are being rapidly secured by miners and investors.

Copies of the Mining Law and any information can be had on application to

THE HON. A. DRYSDALE,
Commissioner Public Works and Mines,
HALIFAX, NOVA SCOTIA.

DIAMOND

DEEP DRILLING

makes economical mining and the deepest hole can be drilled at the smallest cost by a

DIAMOND ROCK DRILL

It can cut through 2,500 feet of solid rock in a vertical line. It brings up solid cylinders of rock, showing formation and character.

Made in all capacities, for Hand or Horse-power, Steam or Compressed Air—mounted or unmounted.

You will find lots of information in our new catalogue—may we send it?

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HADFIELD'S STEEL FOUNDRY CO. LIMITED SHEFFIELD

Heclon Rock and Ore Breaker

HADFIELD AND JACK'S PATENT

The Only Perfect Gyratory Stone-Crusher

THE PARTS THAT ARE SUBJECT TO EXCESSIVE WEAR ARE MADE OF

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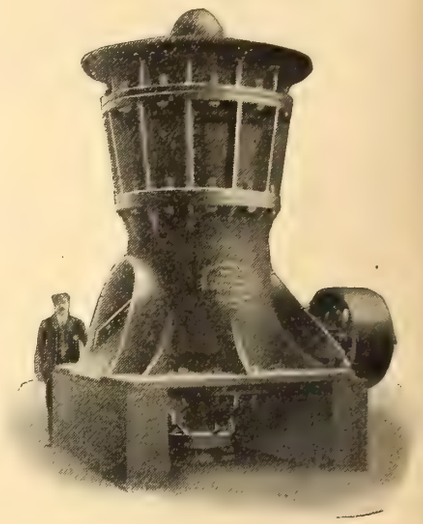

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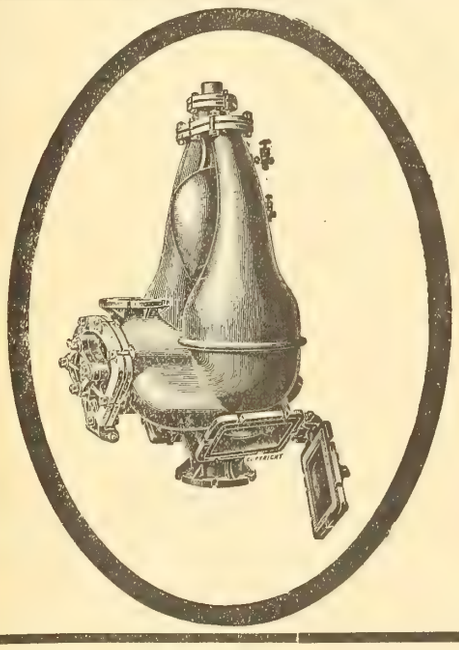

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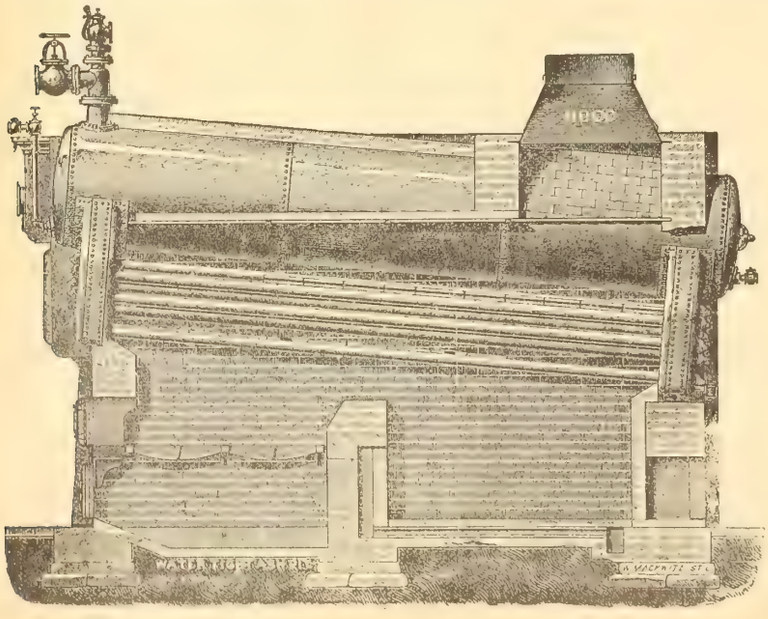

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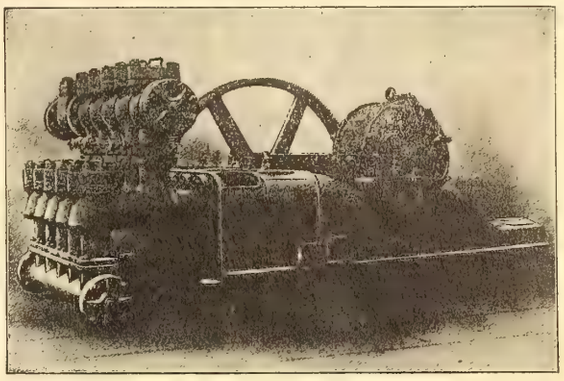

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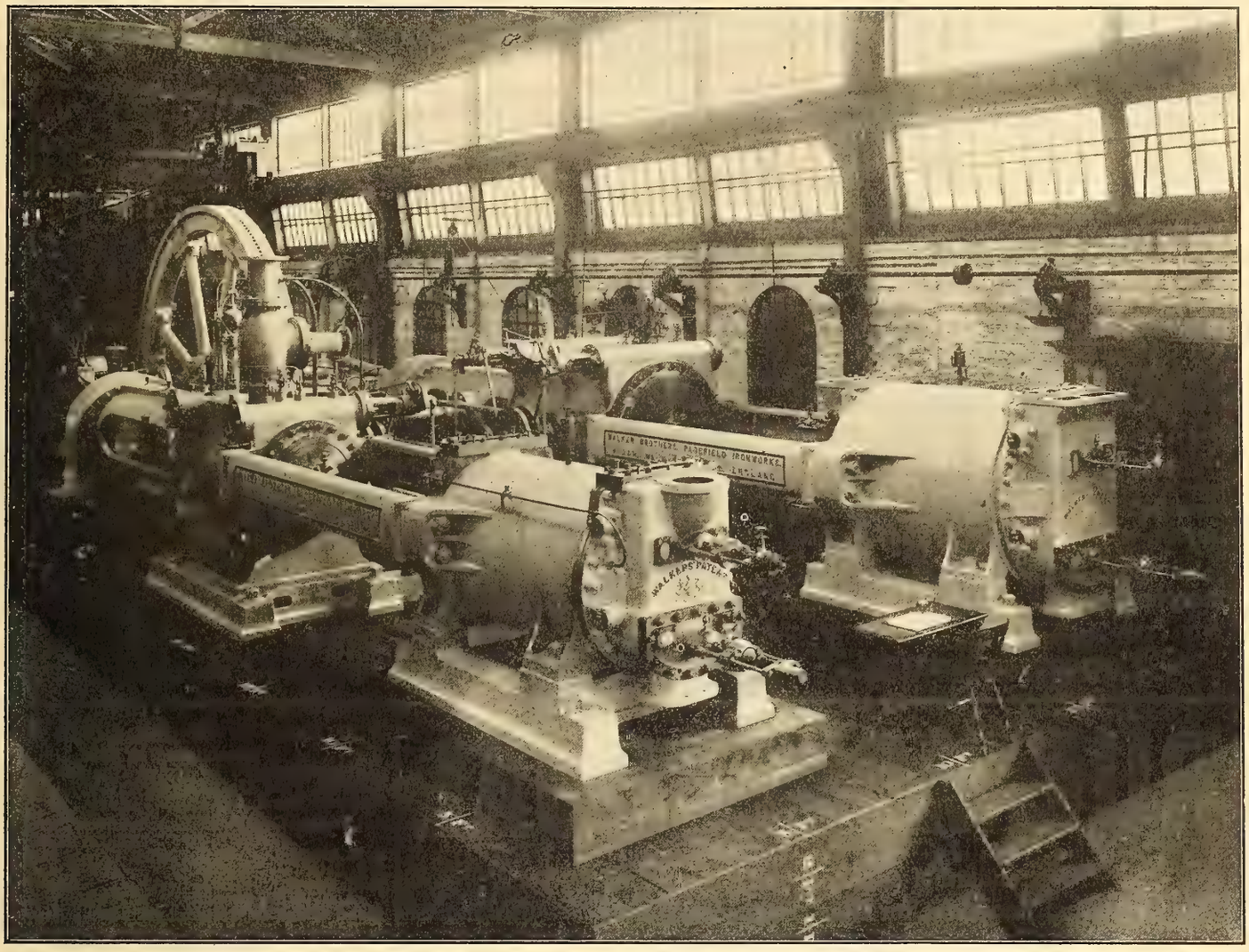

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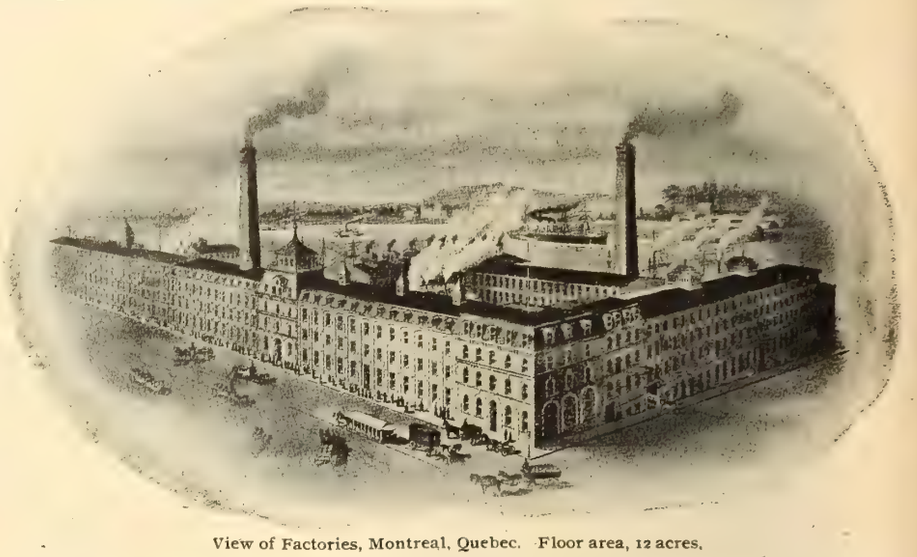

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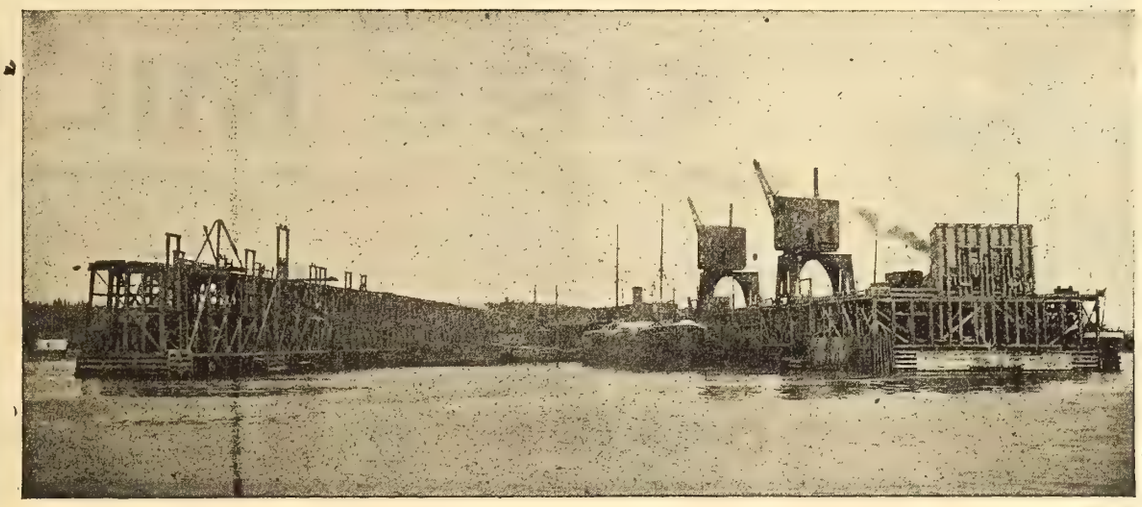

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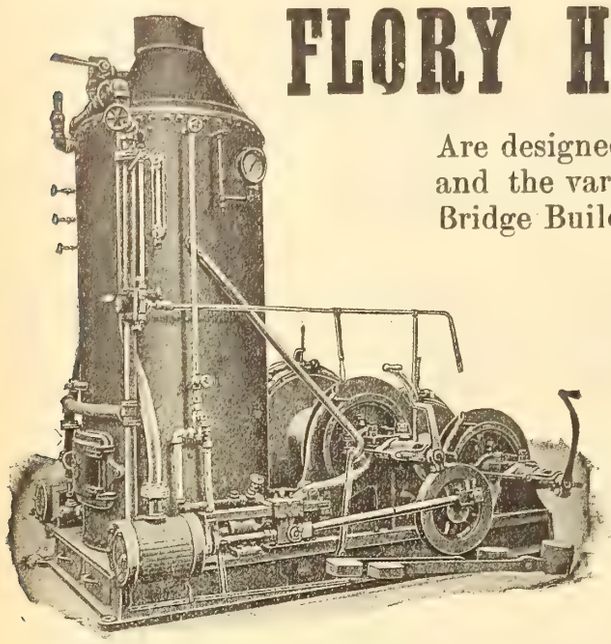

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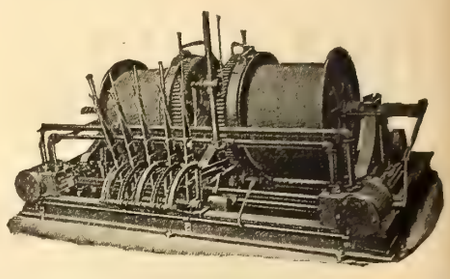

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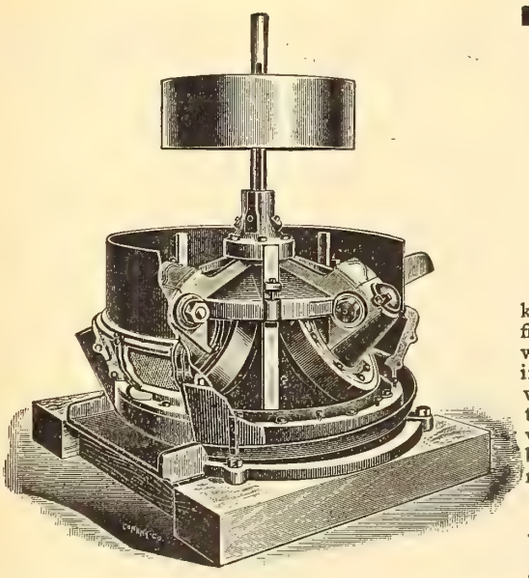

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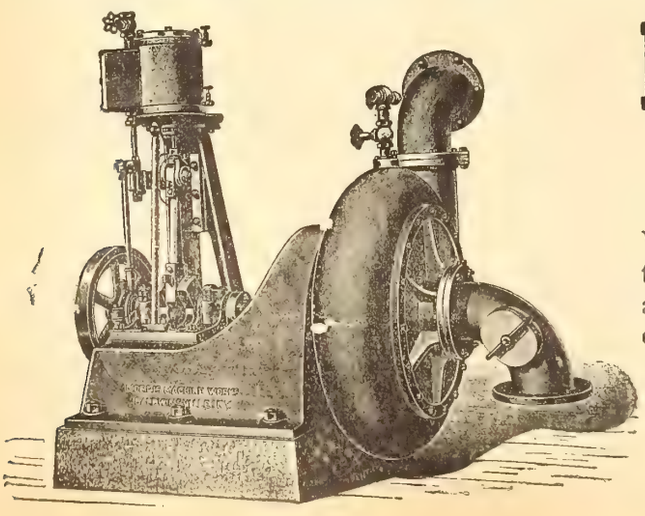

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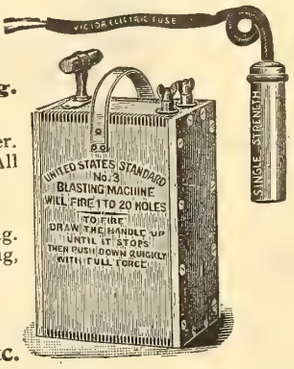

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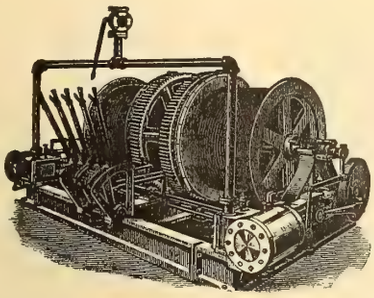

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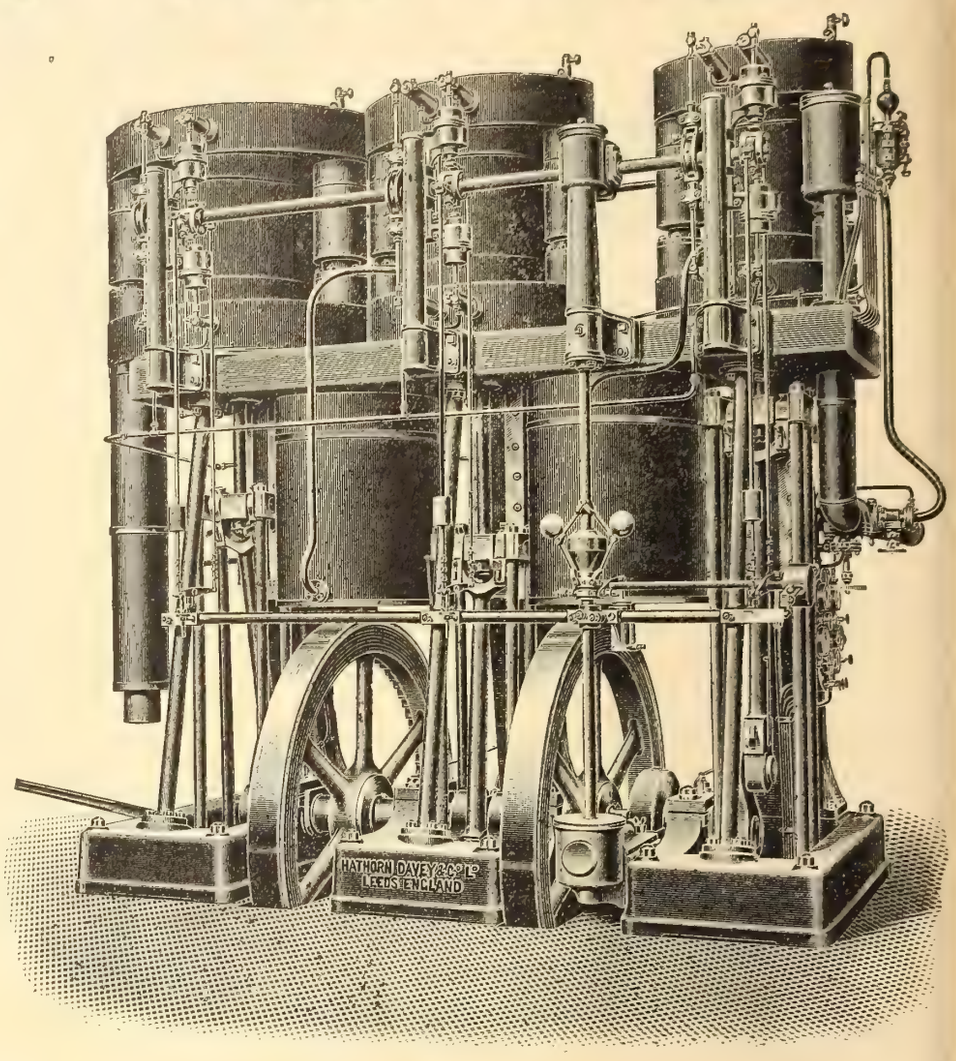

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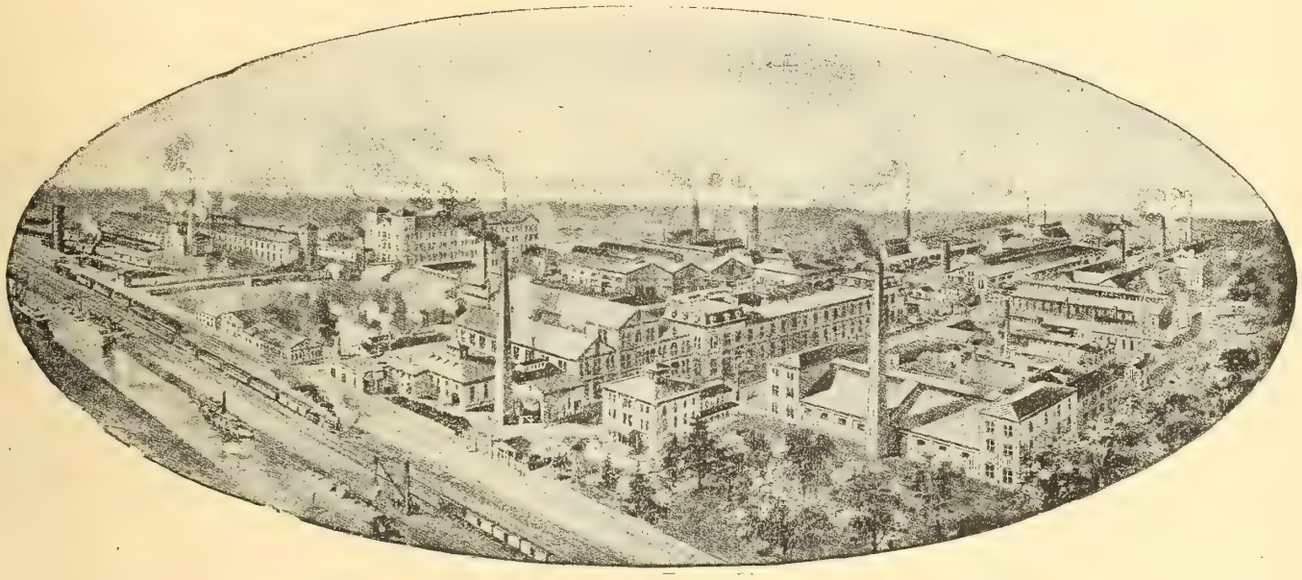

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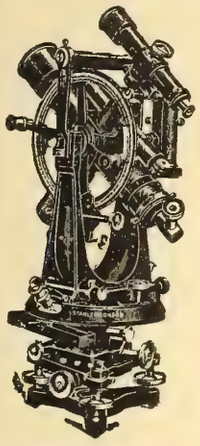

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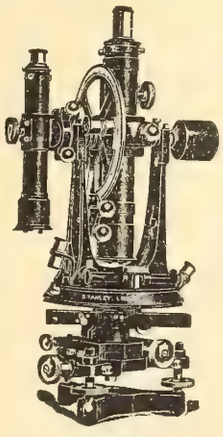

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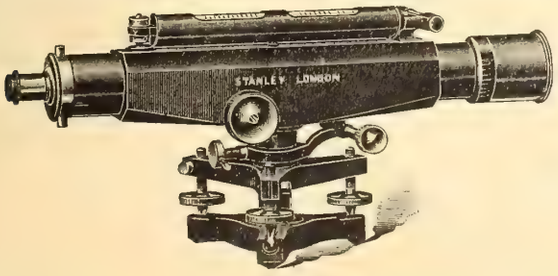

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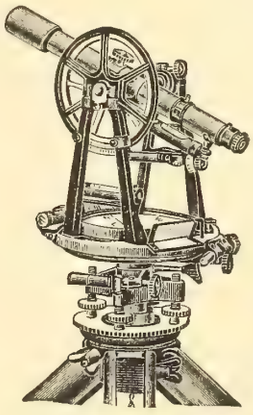

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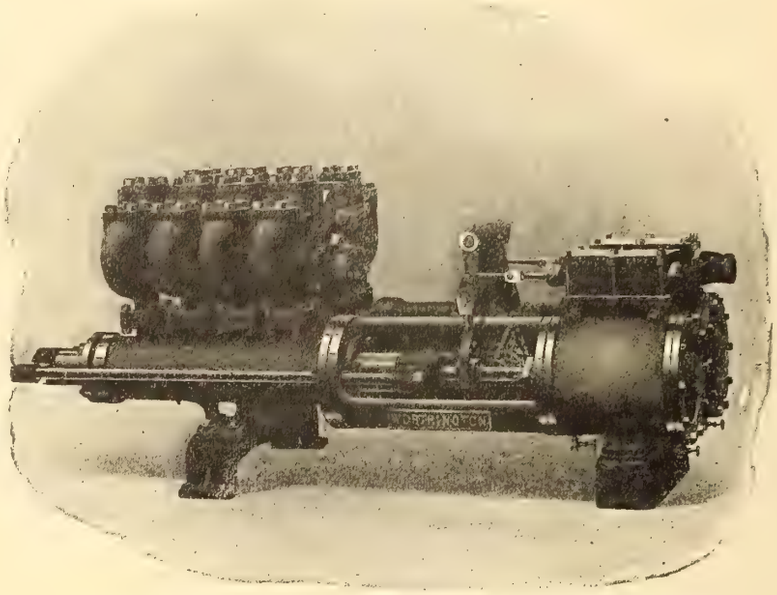

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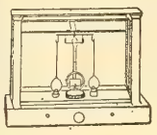

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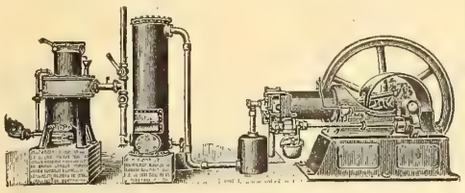

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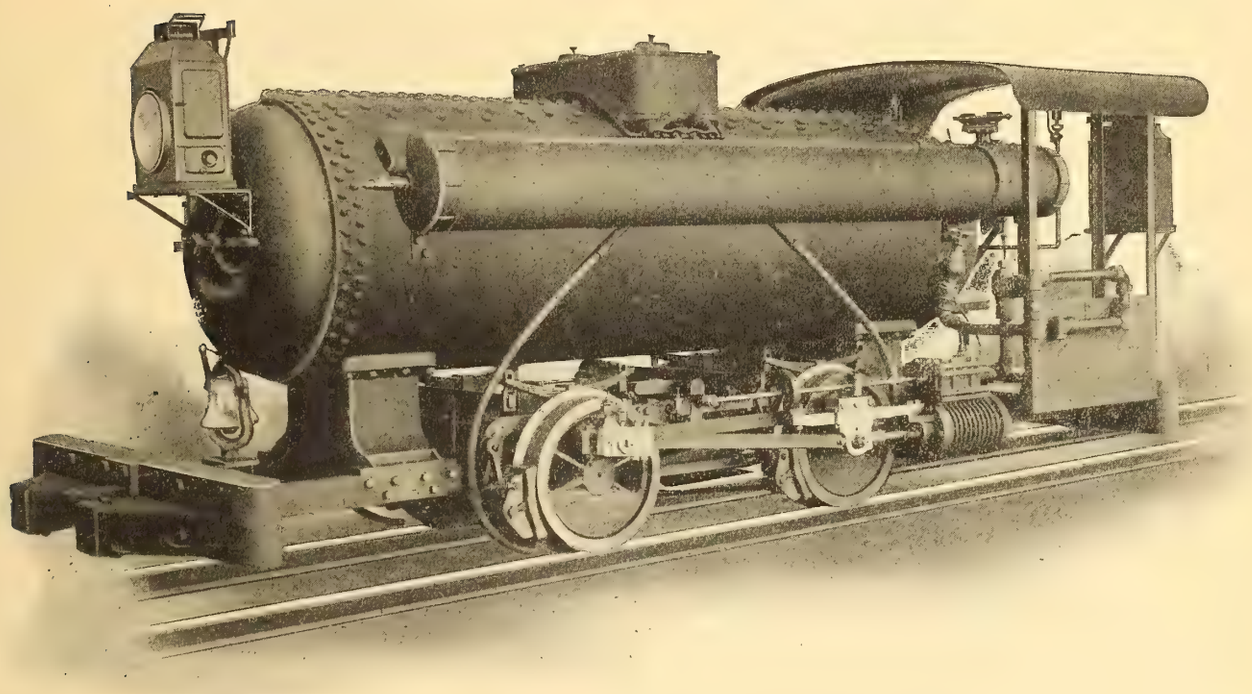

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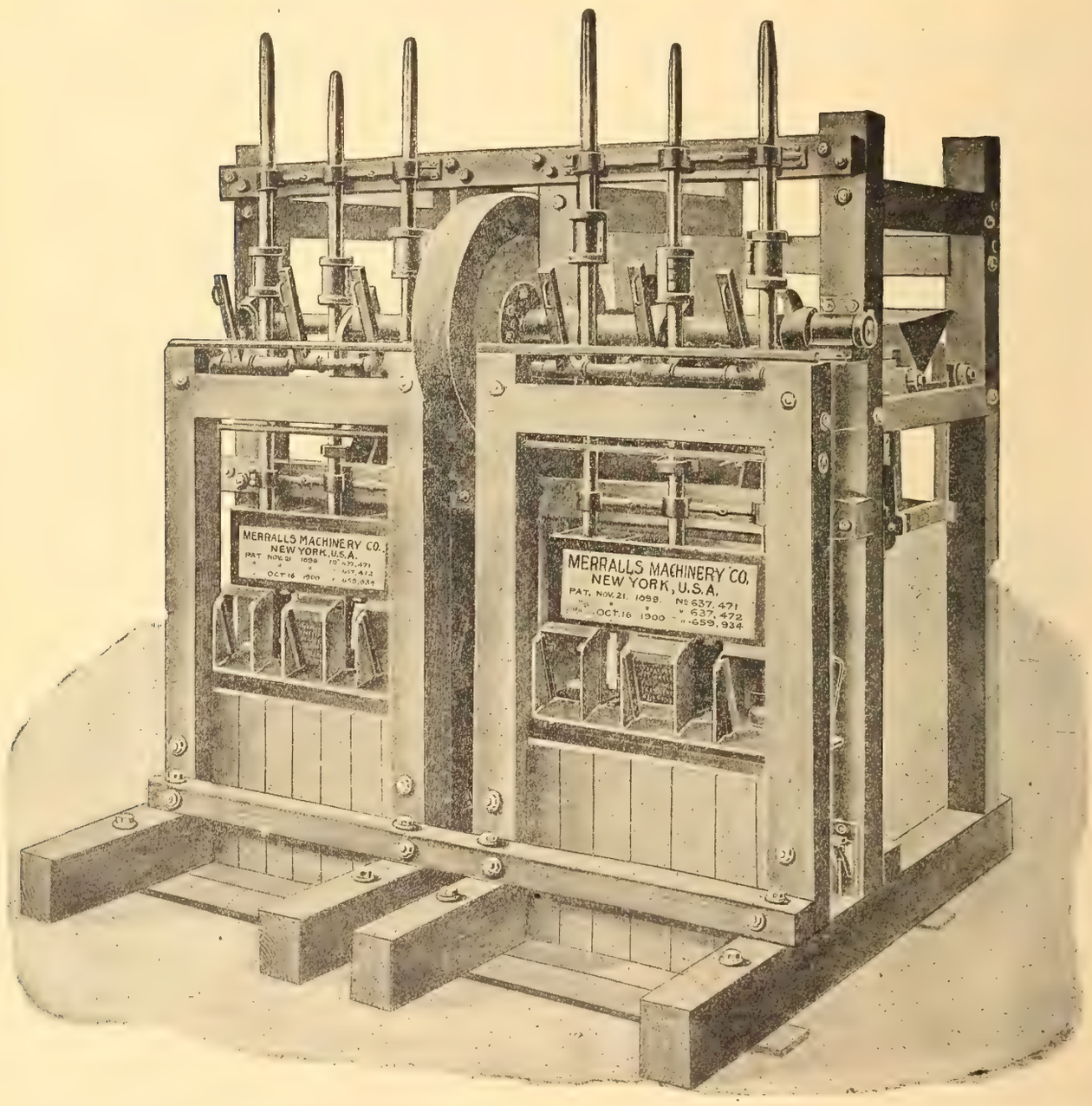

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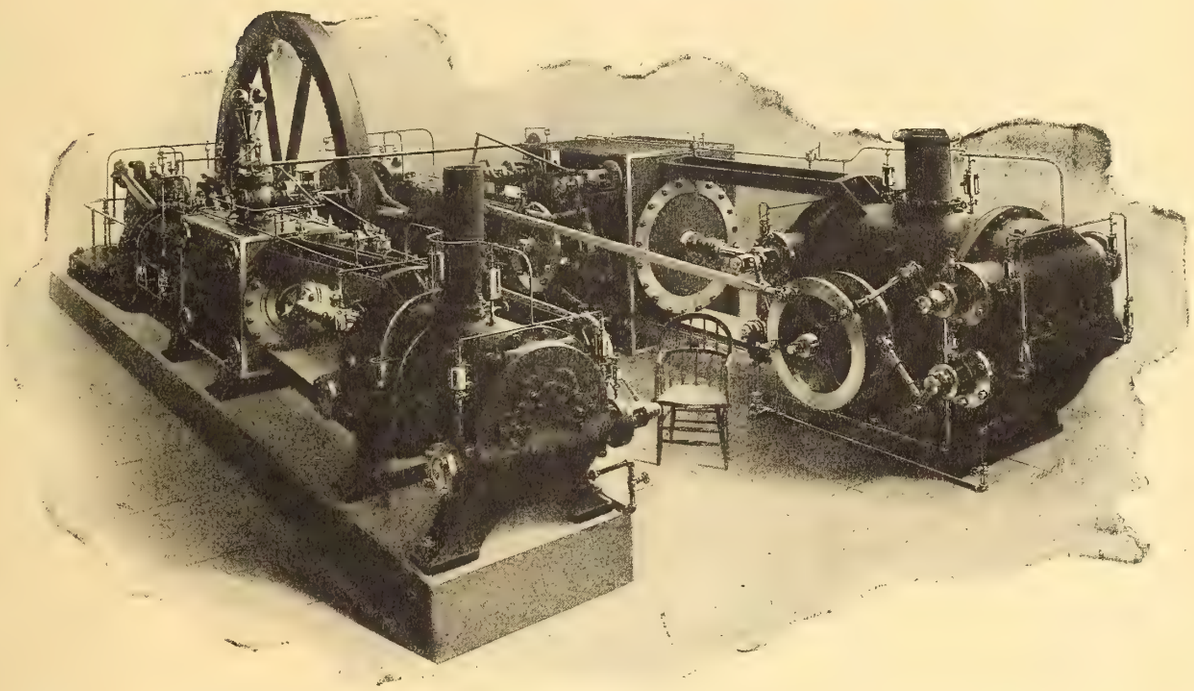

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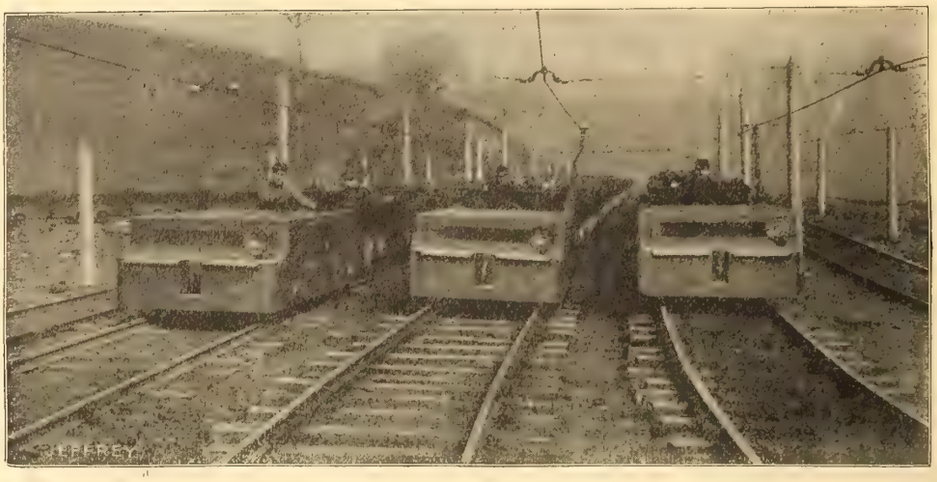

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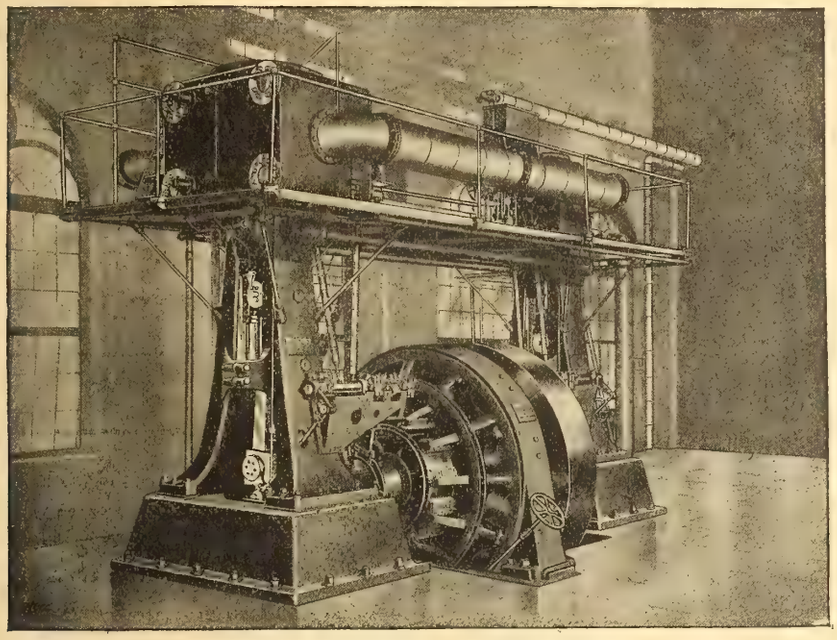

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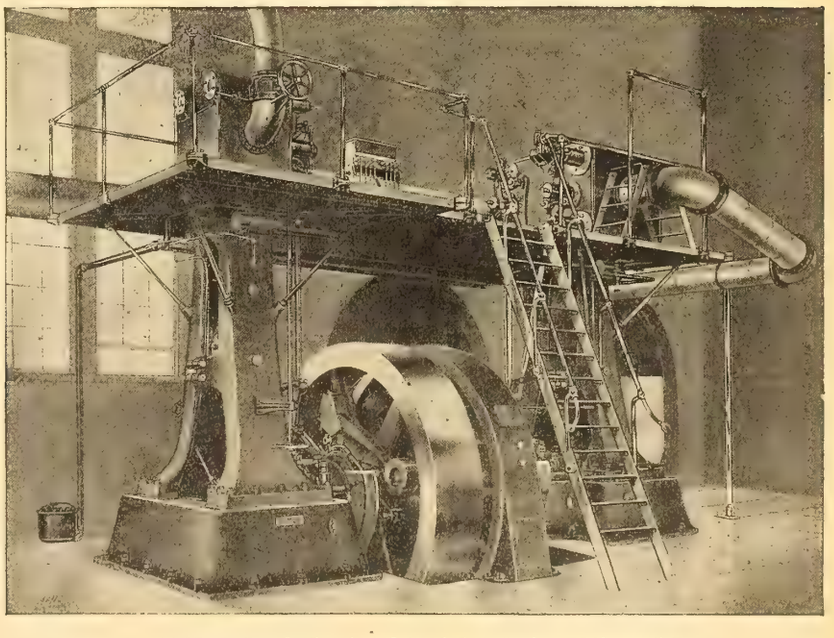

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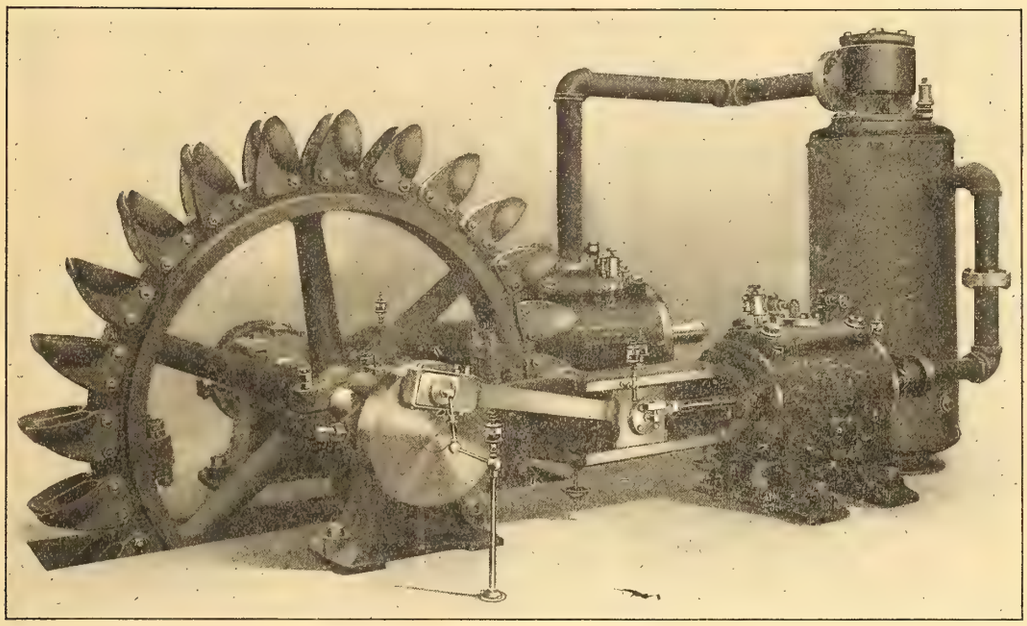

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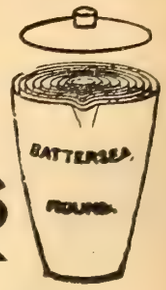

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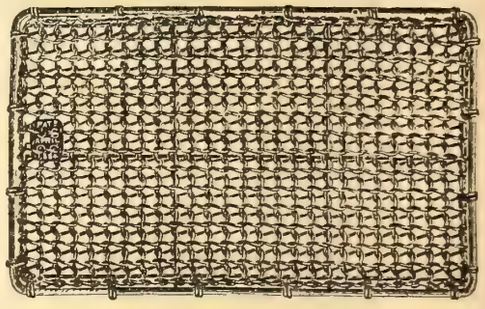

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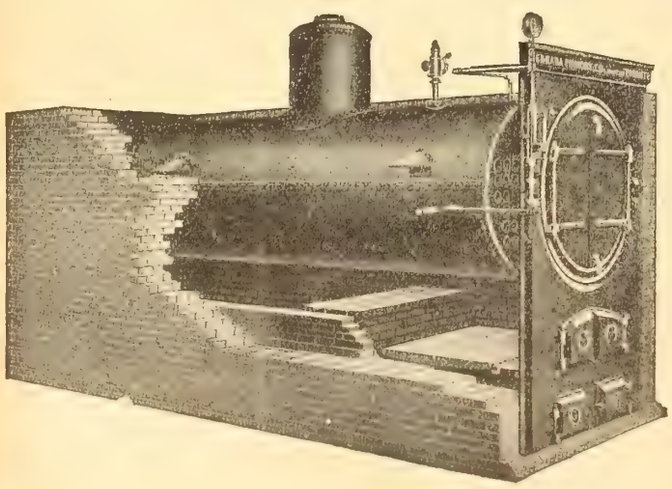

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In the last few issues of the REVIEW a good deal of attention and space has been devoted to the new Temiskamingue district of Ontario. If similar valuable discoveries had been found in British Columbia, the excitement would have been intense, and we should ere this have been bombarded with "boom" literature. As, however, these discoveries have been made in a province where mining is not taken too seriously, except, perhaps, in the case of the big industrial undertakings, of which the general public know little or nothing, the interest created is of the most trivial description, and one may scan in vain the columns of the influential daily press of such a city as Toronto to find even a passing allusion to the extraordinarily rich and promising finds which are now being made almost every week. In spite of this apathy, however, prospectors, largely from the United States, are flocking to the locality, while, too, capital is beginning to make investigations. It is, of course, rather early to make predictions, but it certainly seems likely that the Temiskamingue district of Ontario, and presently the adjacent territory of Chibogamou in Quebec will prove one of the most important productive mineral areas in Eastern Canada.

It is to be hoped that we shall not now have much longer to wait ere the mint at Ottawa is ready to commence the coinage of Canadian metals into currency. During the month there has been several interesting discussions in respect to currency matters, precipitated in the one instance by Mr. Fielding's announcement of the Government's intention to deport, through the banks, who will receive a small commission for the service, American silver circulating in the Dominion. Apart from any question of sentiment, this step has to recommend it sound economic considerations, sufficiently obvious in themselves not to require enumeration. That they have been long recognized in the United States is attested by the fact that Canadian currency is not accepted in that country at its face value, while a Canadian Bank bill (though this is a digression from the point) is rarely if ever accepted as legal tender. Complaints have also been made of the quantity of worn and defaced Canadian silver in circulation, the withdrawal of which might be much more readily undertaken once the mint shall have been established. Again, the mintage of our own currency will naturally consume a respectable proportion of our precious metals output, and thus put a stop to the present large exportation of gold from the Yukon and other gold producing centres through United States channels, while the silver mining districts should experience a material benefit. The establishment of the mint, moreover, may be regarded as the only substantial reason for the maintenance of a Dominion Government Assay Office at Vancouver; since the volume of work there handled during the past year or so was, in relation to the expenditures, inconsiderable, and might have been looked after far more economically under an arrangement with the Provincial authorities. One has only to compare the costs of the two establishments at Victoria and Vancouver to recognize the force of this remark. The subject of the adoption of nickel for coinage purposes was recently mentioned through the columns of the Toronto *Star*, it being pointed out that Canada could not better advertise her valuable resources in this

respect, than by minting the Sudbury nickel for coinage of a low denomination. The present prejudice against the American "nickel" or five cent piece is largely due to its dirty and "counterfeit" appearance, which is attributable to the fact that the nickel is alloyed to such an extent with copper, that it really is not nickel at all, but a copper-nickel alloy. This proposal, meanwhile, finds a very warm advocate in Prof. Miller, Provincial Geologist of Ontario. The chief advantages in using pure nickel for coinage purposes are its wearing and untarnishable qualities, the high scrap value of the metal when finally taken out of circulation and the difficulties in the way of counterfeiting nickel coin.

When the exportation of zinc ores from British Columbia first commenced on anything like an important scale, that is to say two or three years ago, a question arose as to the duty required to be paid thereon, under the American Customs regulation. It appeared that the U. S. Tariff Act makes no specific reference to zinc ores, although in section 181, a special duty is provided for on lead, the section reading: "Lead bearing of all kinds shall be taxed 1½ cents per pound, on the lead contained therein" Now, the zinc ores shipped contained a certain percentage of lead, although it is true an inconsiderable proportion, and, on this ground, Mr. Armstrong, then acting as Assistant-Secretary of the U. S. Treasury Department, ruled, to the great satisfaction of B. C. producers, that the ore might be shipped to that country by paying the duty on the lead contents, the zinc not being considered. Under this arrangement it has been possible to market B.C. zinc ore in the United States upon a reasonably profitable margin. The controversy in respect to the matter, has been, however, again re-opened by Missouri zinc mine operators, who claim that Canadian exporters should be compelled to pay duty, not on the lead but on the zinc contents of the ore shipped, under section 183, which provides that "Metallic mineral substances in a crude state, and metals unwrought, not especially provided for in this Act, shall be taxed so *per centum ad valorem.*" The Missouri-Kansas miners contend that Canadians are now their chief competitors and that the notably small duty at present paid on imported ores from this country, does not afford to them an adequate protection. Pressure is, therefore, being brought to bear on the authorities at Washington to rescind Mr. Armstrong's ruling. On the other hand, the American zinc smelting interests are opposed to any change from the existing regulation, as they are able to deal more advantageously with Canadian producers than with their American countrymen. Should the mine operators be successful in their suit, there can be little doubt that the imposition of a duty of 20 per cent. would exclude Canadian zinc from entering the American market and temporarily, at least, inflict a heavy blow on a young and promising industry. If we may judge, however, from the closely analogous circumstances appertaining to the development of the lead mining industry in British Columbia, the ultimate result of this antagonistic measure would be the establishment of plants in Canada for the treatment and manufacture of zinc, while, in the meantime, no doubt, if the railway companies can be induced to lend their co-operation by a reduction in freight rates, the product will be largely marketed in Europe.

Commenting on the visit of the Canadian manufacturers to Great Britain, the *Iron and Coal Trades Review* remarks on the fact that Canadians are evidently desirous of establishing closer commercial intercourse with the Motherland, and refers to the effect of the new dumping clause which, it is thought, will be certain to increase Canadian imports and not least those of iron and steel from Great Britain. Our contemporary points out that "between the five-yearly period, 1889-1893, on the one hand, and the year 1902 on the other, the United States made extraordinary advances in Canadian markets. The proportions supplied during this interval under each principal head by the two countries varied as follows:—

	Great Britain.		United States.	
	%	%	%	%
Pig-iron	60	to 26.05	40.	to 73.66
Rails, etc.	80.9	to 35.87	9.1	to 49.47
Castings and forgings	32.9	to 3.55	60.8	to 96.07
Other iron and steel	72.3	to 34.31	27.7	to 56.80
Machinery	17.8	to 6.16	82.2	to 93.03
Hardware and cutlery	31.6	to 15.66	68.4	to 77.38
Interchangeable mechanism.	10.8	to 1.65	89.2	to 96.51

"It will be observed that in every instance the proportion contributed by Great Britain has seriously declined, while that contributed by the United States has similarly advanced. Relatively, this country does not appear for many years to have cut much of a figure in supplying Canada with machinery, and the proportion of 6.16 per cent. furnished in 1902 is hardly a matter for pride or satisfaction. But in 1902 we had reached the low level of supplying only 26.05 of the Canadian imports of pig-iron, 35.87 per cent. of the Canadian imports of rails, and 34.31 per cent. of the imports of other forms of iron and steel."

Unless, however, British business methods are very radically changed, it is questionable whether preference in the matter of duties or other concessions will materially affect the situation, particularly so far as mining machinery is concerned. In too many cases the British manufacturer does not understand the meaning of the word, promptitude, while he is strangely deficient in enterprise. Moreover, American mining machinery is better adapted, as a rule, to requirements in Canada, and has the great advantage of being standardized, so that in the case of accident parts may always be readily replaced upon short notice. It may be mentioned in this connection that many of the leading mining manufacturers in the United States are now establishing businesses in Canada.

The mortality which has prevailed during the last three years amongst the wild-cats of B. C. has now taken a firm hold on the Ontario corporations whose origin lay in values that either never existed or were of a very temporary nature,

and the winding up of a number of these concerns this month is a matter worthy of note and congratulation. Ontario suffered less than B. C. by reason of the lesser value of its new fields and the smaller area available for the promotee. That the last of the pernicious brood which was bred in the boom times of '96, '97, and '98 is now in its death throes is a matter for rejoicing to every one interested in legitimate mining. Following this removal of the maimed, deformed and diseased amongst the mining corporations of B. C. has come a genuine, healthy but slow growth of legitimate undertakings in British Columbia and we have no doubt that the same sequence will be seen in Ontario. We have already noted the development of the latest field in Ontario, and, apropos of the second instalment of Mr. John E. Hardman's article on the new mineral area in Ontario, we learn that of all the new discoveries in the Temiskaming district only two have been organized as stock companies, and those two have named capitalizations that are reasonable and commensurate. The bringing into Ontario of men who have already had experience in other fields is another healthy sign; not only will this introduction tend to counterbalance any overestimates by local men, but it will also benefit the region by the experience which these men have had under diverse and different conditions in other parts of the world. The MINING REVIEW has never been accused of optimism, but it regards the present healthy clearing of the mining atmosphere with the greatest satisfaction, and looks upon the whole mining situation in Canada as healthier than it has been for ten years. That Ontario and Northern Quebec have, in common, a new mineral area which promises a great production is unquestioned.

In our next issue we shall begin the publication of an article from the pen of Mr. J. E. Hardman, who has returned from a somewhat lengthy investigation of the region beyond the Height of Land in Quebec. There is every reason to suppose that the new metalliferous belt of that region is continuous in a westerly direction to Lake Abitibi, and beyond, a distance of over 250 miles; and as it has a width of over 40 miles, there are something like 10,000 square miles of new metalliferous country available for ore prospecting, and results will not be long in arriving.

In a series of leading articles the Halifax *Chronicle* has recently been endeavouring to prove that the governmental assistance granted the iron and steel industries is responsible for the shrinkage of iron ore production in Nova Scotia, which has declined from 83,792 tons in 1895 to 50,000 tons in 1904, and the recommendations are made (1) that should the local iron and steel manufacturers ask for the renewal and extension of the bounties, at the expiration of the present time, their neglect of the local iron fields should be the subject of enquiry and the utilization to a great extent in future of Nova Scotian ore made a condition of any such renewal or extension of the grant; or (2) bounties might be paid directly to the iron ore miner. These contentions are, of course, very absurd to anyone conversant with the true state of affairs, and we entirely agree with the eminently sensible remarks of our contemporary, the Maritime *Mining Record* in criticism of the *Chronicle's* position. The fact of the matter is that the search for iron ores of commercial grade in Nova Scotia has, so far, unfortunately, proved largely resultless. At Tarbrook, it is true, ore of good quality has been found, but the quantity is inconsiderable and the ore lies at such an angle as to render it too difficult to work. At Pictou, in the vicinity of Bridgeville, no iron of desirable quality has been discovered, all the ore there requiring to be washed; at Cape Breton there are no ore bodies of any size, while in the neighborhood of Londonderry, the iron which is low grade, only suitable for certain kinds of castings, notably pipe castings, is utilized by the Drummond works. If local ores were procurable, it is hardly likely that the iron and steel undertakings in Nova Scotia would go elsewhere for their supply, since, moreover, they would be entitled to an additional dollar per ton bonus in the case of products manufactured from local ores. We do not, of course, deny the existence of commercially marketable iron ore bodies in the Maritime Provinces, but they have yet to be discovered. The search in itself should be worthy of effort, but if further stimulation is necessary, the initiative surely rests with the Provincial and not the Dominion authorities.

Brief mention was made in our last issue to the fact that in consequence of the acquittal of the union miner Roberts, who had been tried on the charge of shooting with murderous intent at Mr. M. S. Davys, a well-known Kootenay mine operator, Mr. Davys had decided to "close down" the several properties he was working under lease rather than employ union labour. In the current number of the MINING REVIEW we print a letter from Mr. Leslie Hill very clearly setting forth the facts in connection with the assault on Mr. Davys, and commenting on the result of the trial, which he describes, not, we think, without reason, as a grave miscarriage of justice. A very considerable proportion of the miners employed in the Kootenay mines are Americans; many of them come from the Coeur d'Alene and other mining sections of the Western States, where the blowing up of mills and the shooting of managers are fashionable methods of protesting against real or imaginary grievances. It is, however, of very real importance that these gentry should be taught that in British territory anarchy and violence meet with instant reprisals. In this case, Roberts was probably given, in accordance with the customary practice of British Courts of Justice, the benefit of the doubt; but from Mr. Hill's account of the evidence, there was little room for doubt, and the Court therefore appears to have displayed a clemency, which, under the circumstances, can hardly be regarded as either just or wise. It is not the first time that union miners in British Columbia have undertaken to argue their cause by an appeal to force, for it is not so long ago that a mine-manager who had employed a Chinese cook whom he was accompanying to the mine, was ambushed on the way by a body of his men, who, after overturning the manager's carriage, drove off the

Chinaman with blows. That sort of thing is not to be tolerated for a moment, and it is distinctly to the interest of British Columbia that the sensible minded people resident in the province should discountenance doings of the kind in every way in their power.

The announcement that the Dominion Government has increased the duties on white lead and lead in oil from, in the one case, five to thirty per cent., subject to the British preference, and, in the other, from twenty-five to thirty per cent., has been received with general satisfaction. Up to the present time we have been content to mine our metals merely in order to supply other countries with raw material. It is a good sign of the times that a change is now taking place in more than one direction. Meanwhile, the first step towards the establishment of a lead manufacturing industry in Canada was the successful operation of a plant installed by Mr. W. H. Aldredge, for the refining of silver-lead ores by electrolitical methods, with the result that the Trail smelter has, for some time past, been turning out a very fine quality of pig lead. Following the introduction of lead refining in British Columbia, a leading industrial firm, engaged in the manufacture of white lead in Western America, recognizing the Canadian market possibilities in this regard, in October last organized a company in Canada to commence the production of white lead in Montreal, and during the past few months the work of equipping a factory for this purpose has been in progress, manufacturing operations having commenced last month. The present consumption of white lead in Canada is between six and seven thousand tons per annum, but with the developments that are now taking place in the West, this consumption is certain ere long to show a considerable increase. The increase in tariff will, to this extent, conserve the Canadian market for Canadian lead, with a consequent improvement of lead mining conditions in the West. At the same time, as the annual production of British Columbia lead mines is more than double the Canadian consumption of manufactured lead, the final solution of the problem has yet to be sought.

It has been the policy of the Ontario governments during past years to do everything that was possible to encourage mining effort in that province, and it may almost be questioned whether in pursuance of this policy the industry has not been injured by overpampering; at any rate, there are a number of mining men who have arrived at that conclusion, and in view of the dissatisfaction expressed in regard to the mining law as it now stands, the new Minister of Mines, the Hon. Frank Cochrane, has decided to introduce amendments to the Ontario Mines Act, proposing first to visit the various mining sections to ascertain the views of the mining communities, who will thus become responsible for any changes that may be made. The time is, we would suggest, opportune for the establishment in Ontario of local branches of the Canadian Mining Institute, under whose auspices the subject of the proposed revision of the mining laws might be thoroughly canvassed and discussed, with a result that probably present conflicting opinion would be largely reconciled, and the final presentment of recommendations to the Minister have some appearance of unanimity of view.

The members of the American Institute of Mining Engineers who, last month, took part in the excursion to Western Canada in order to attend the summer meeting in Victoria appear to have enjoyed themselves thoroughly, thanks to the warm and hearty hospitality shown them by our British Columbian friends, and the carefully thought-out arrangements made for the reception and entertainment of the visitors by the local committees of which Mr. W. F. Robertson acted as chairman, and Mr. W. M. Brewer as secretary. At Nelson the Canadian Mining Institute was represented by Messrs. S. S. Fowler and R. Hedley, both of whom are members of this year's Council. From the reports that have so far reached us, the visitors have been more than all else impressed with the inspiring scenic magnificence of the Western Province, but at the same time the mineral potentialities of the country will not have been overlooked and doubtless this visit of the American Institute will be the indirect cause of inducing the further investment of American capital in British Columbian mining undertakings.

Our special correspondent in British Columbia sends us the interesting intelligence that the Huntingdon-Heberlein process for the desulphurization of lead ore is likely to be employed shortly by both the Trail and Nelson smelters, the process being already in use and, it is said, giving excellent results at Marysville, E. Kootenay. In a recent issue the *Engineering and Mining Journal* announces that the American Smelting & Refining Company is also preparing to adopt this process, not only in the desulphurization of all classes of lead ore, but also of lead matte, while recently the utilization of the process in Australia, has resulted in a very considerable reduction in smelting costs. The process appears to offer many advantages over existing roasting methods, in so much as the silver and lead losses are practically nil and sulphur is more thoroughly eliminated, while the form into which the ore is reduced increases the smelting speed of the blast-furnace. It is stated that the adoption of the process in the Kootenays, would effect a saving of nearly twenty-five per cent. a ton in lead treatment costs.

According to a recent report of the manager there is still some prospect of the re-habilitation of the North Star at Kimberley, E. Kootenay, owned by the North Star Mining Company of Montreal. It will be remembered that last year it was practically decided to discontinue operations, after extracting the little remaining ore, but in the interval not only has "clean" ore from the old ore-body been shipped at a profit, but a considerable tonnage of second class material has also been successfully marketed, in so much so that a net profit of about $40,000 has been realized and the directors have been enabled during the year, to make two cash distributions to shareholders, amounting to ten cents per share. In view of this

excellent showing, the manager, Mr. N. McL. Curran has been sanctioned by the board to carry out his programme of exploiting the ground adjacent to the Kellog shaft. Until this shall have been done, the property, in Mr. Curran's opinion, cannot be regarded as having been thoroughly prospected. All of which is good news.

With the advance of nickel plating in Japan and the use of the metal as an amalgam, it is believed that Canada should be able to secure a considerable share of this trade in the Japanese market, and recently a number of enquiries have been received by the Dominion Government's commercial agent in Japan from several merchants, with regard to Canada's capabilities in this direction. According to the Department of Trade and Commerce reports, the amount of nickel exported from Canada during the fiscal year of 1904, is valued at $1,200,000. During the past five years Japan has imported nickel to the value of between approximately $60,000 and $145,000. In 1904, however, the importations reached but $62,424, in consequence of the production of the free coinage of Korean nickel coins in Japan and the suspension of the minting of nickel currency by the Korean government. At present nickel is chiefly imported through British, German and French channels.

A NEW MINERAL AREA IN ONTARIO.

By John E. Hardman.

Part II.

Since the first of May development in the silver-cobalt section of Coleman township has been rapid and many new discoveries have been made. The areas within which profitable ores have been found has not materially increased, and may still be roughly defined as covering about five square miles, extending easterly from the Trethewey property for about two miles and southerly from the Timmins mine for two and a half miles. Reputed discoveries on the Gillies Timber Limit can not be confirmed by the writer, as such are covered as soon as found, and as the government refuses to grant licenses on discoveries applied for which are within the limit. It is, however, altogether probable that such discoveries have been made, and that the areas will be prolonged in a north and south line. The reputed discoveries of cobalt bloom are numerous, but credible evidence of silver contents is lacking.

The principal discoveries upon new lots are the following:

A five inch vein on the eastern shore of Glen Lake, in the 4th lot of concession IV. This is known as the "Foster" property, and is rich enough to keep up the credit of the district for high grade shipments. Within two weeks from discovery Mr. Foster shipped out his first car load of ore, and is rapidly extracting ore from a very rich vein. Besides the original discovery two other veins have since been found both of which carry shipping ore.

Mr. Herbert E. Lawson, an English gentleman of experience in mining, has also made a very rich discovery in the location lying immediately west of the Jacobs property (269). An irregular vein varying from 2 to 5 inches in width, has been opened from which a shipment is now being made. This discovery is, as yet, comparatively undeveloped; the vein is from 2½ to 4 inches in width, with numerous veinlets or branches ramifying from it; its outcrop, in places, shows a large amount of free metallic silver in small leafs and flakes. One peculiarity is the occurrence of a crystalline calcite in portions of the filling with flakes of metallic silver apparently occurring on one plane of the room bohedron.

A shipment is now sacking at the mine, from which phenomenal returns are expected. The smaltite of the vein presents no unusual features.

On the R. L. 402 Mr. M. P. O'Brien and associates have found several veins, one of which, about seven inches wide, is above the average richness of the region. In connection with all of these discoveries there are numerous disputes as to titles, ownerships, etc., and the land office has much work ahead of it in the way of hearings between the disputants. For some of the controversies suits-at-law are already begun, and a waste of good money in the courts is inevitable.

On the olden properties new veins have been uncovered. The Timmins property, probably the most valuable of the region, began work with two known veins, it now has over a dozen. The main shaft has now reached a vertical depth of 100 feet, and carries a total of 42 inches of ore at the bottom. Two of the veins, separate at the surface, have united into one which has a width of 22 inches; the two other veins are still

Bottom of Trethewey Shaft, from a Photograph taken at the end of June.

separate though converging, and, together, afford 20 inches of stoping ore. The value of the ore is reported by Mr. Henry Timmins to be higher than it was at the surface, and the fine grained "slate" or tuff (referred to in a previous article) still remain in the shaft. The shipments from the Timmins mine now exceed those of the Earle property (Nipissing Mining Company) and it ranks as the largest producer of the region.

The Drummond property has been incorporated under Dominion Charter as "The Drummond Mines, Ltd," and wonderful new discoveries have been made there. In April there were two known veins, there are now eight. The new discoveries are about 200 feet to the east of the old vein, and four

veins have been found within a width of 11 feet. One of these ranges from 5 inches to 22 inches in width, another of 7 inches and the other two are from 1½ to 2 inches wide. The average aggregate width of ore in the eleven feet is from 17 to 18 inches. Another vein over 2 inches wide is known as the "Blue Jay." All of these discoveries are yielding ore of the value of $1,000 per ton or better.

On the adjoining lot (269) owned by Jacobs, Steindler *et al.*, a unique discovery has been made in the south boundary of the lot. Here Mr. Robt. Jacobs, the superintendent, has a five to six inch vein, running north and south, which occurs in the diabase or gabbro. The northern end of the present opening near the contact of the gabbro and slate afforded magnificent slabs and nuggets of silver on the surface. No depth has yet been reached, the force being utilized to ship the outcrop to the boundary line. Whether a vein in the gabbro will contain silver minerals to the extent that it does in the slate is a question the answer to which is awaited with anxiety by many mine owners in the district. The occurrence of chalcopyrite and galena in this new vein may have no special significance, but the best informed believe it signifies the disappearance of the silver. A fissure in this eruptive will, in all probability, be of greater lateral and vertical dimensions than one in the overlying slates. The southerly extension of the Jacobs vein has been located by a Mr. Harsgraves, who at once began shipping the outcrop. At the time of inspection no valuable mineral had been exposed by this work. So far as the writer knows,

Microscopic Section Characteristic of the Silver-Bearing Rock of the Temiskaming District.

this vein is the only one in the gabbro which is being worked; its development will afford most valuable information.

Altogether the new mineral area in Coleman township has made a wonderful showing in 1905. Many experienced men from all over the country have been attracted to the region and their varied knowledge will undoubtedly keep forward its development. British Columbia has sent Messrs. Empey, Hamilton and Brigstocke; Michigan has contributed Mr. Foster; England, Mr. Lawson, and other countries other men. It is to be regretted that the local authorities and capitalists of the town of Haileybury and New Liskeard do not recognize the new conditions and meet them.

In summer the pleasantest way to reach the new district is to go via C.P.R. to Mattawa and there take the train for Temiskaming on the lake of that name. Here one finds a very good boat, built and equipped by the late Alexander Lumsden (of Ottawa), whose estate owns the fleet of steamers which run from Temiskaming to New Liskeard. The S.S. "Meteor" is commodious, clean and well handled; its dining room supplies a good meal, and its waitress is an agreeable change from the abominations of the Haileybury Hotel. On the "Meteor," the fresh young waitress (whose name is Agnes, but should have been Hebe), serves you well cooked food with clean hands and clean table ware, but when you land at Haileybury and go to the "Vendome Hotel," you find the "lumber-jack" paramount. He who patronizes the bar, spending his money over a dirty slab of wood is taken care of while his money lasts, but the temperance man who cares more for a clean room and a place where he can sit without being trodden upon by drunken louts, had better pass by the Vendome and go elsewhere.

In contrast to the Hebe, already mentioned, one meets in the dining-room with a female in a pink blouse, who has dark hair, whose quantum of conceit is unmeasurable by any unknown unit, and whose hands—but that may be imagined. To the innocent request for "boiled eggs,"—this dark beauty (?) replies by shouting aloud to the kitchen, "This man wants eggs," whence comes the reply, "Tell him he can't have no eggs." There is no need to tell "him"—everybody in the room who is not deaf has been told already.

A new hotel is nearing completion, and the writer trusts it will have someone of intelligence in charge of it. Haileybury should have profited largely by the new mining industry, but it has refused to recognize its opportunity and much business has therefore gone to New Liskeard.

The writer also regrets to note that the Temiskaming and Northern Ontario Railway officials are increasing the freight rates on ore shipments by 33 1-3 per cent. If ore can be sent to New Jersey, from North Bay for $5.00 per ton, it is nothing short of robbery on the part of the Ontario Government's Railway to ask $3.00 to $3.20 per ton from Cobalt to North Bay. The industry is too strong to be throttled by railway rates, but the Ontario voter has a loud voice and sooner or later makes the public hear him.

CORUNDUM MINING IN ONTARIO.

Some important improvements and addition to plant have recently been made by the Canada Corundum Company. The property was recently visited by Prof. R. Richards, the well-known authority on separation, who had been retained by the company to make a special report and advise as to the condition of the plant. The company having found that ore crushed fine to three milimeters, to free the corundum from the gangue, would not pass through the trommels. Prof. Richards informed the management that much the same difficulty had been experienced at the Calumet and Hecla mine, and he proposed overcoming it in the same way by designing classifiers which would replace the trommels. These classifiers will crush the ore to a fineness of three milimeters instead of six. The company has also installed new additional pumps, magnetic separators, additional graders and a dynamo. The mill has also been thoroughly overhauled, and its capacity increased from 100 to 215 tons a day, while the percentage of recovery has been also increased from between 55 to 60 per cent. to from 80 to 85 per cent. Milling operations were resumed during the first week of July. We expect to publish a complete set of photographs showing the new machinery at the company's mill in an early issue of the REVIEW.

THE RECENT ESTABLISHMENT OF LEAD-CORRODING WORKS IN MONTREAL.

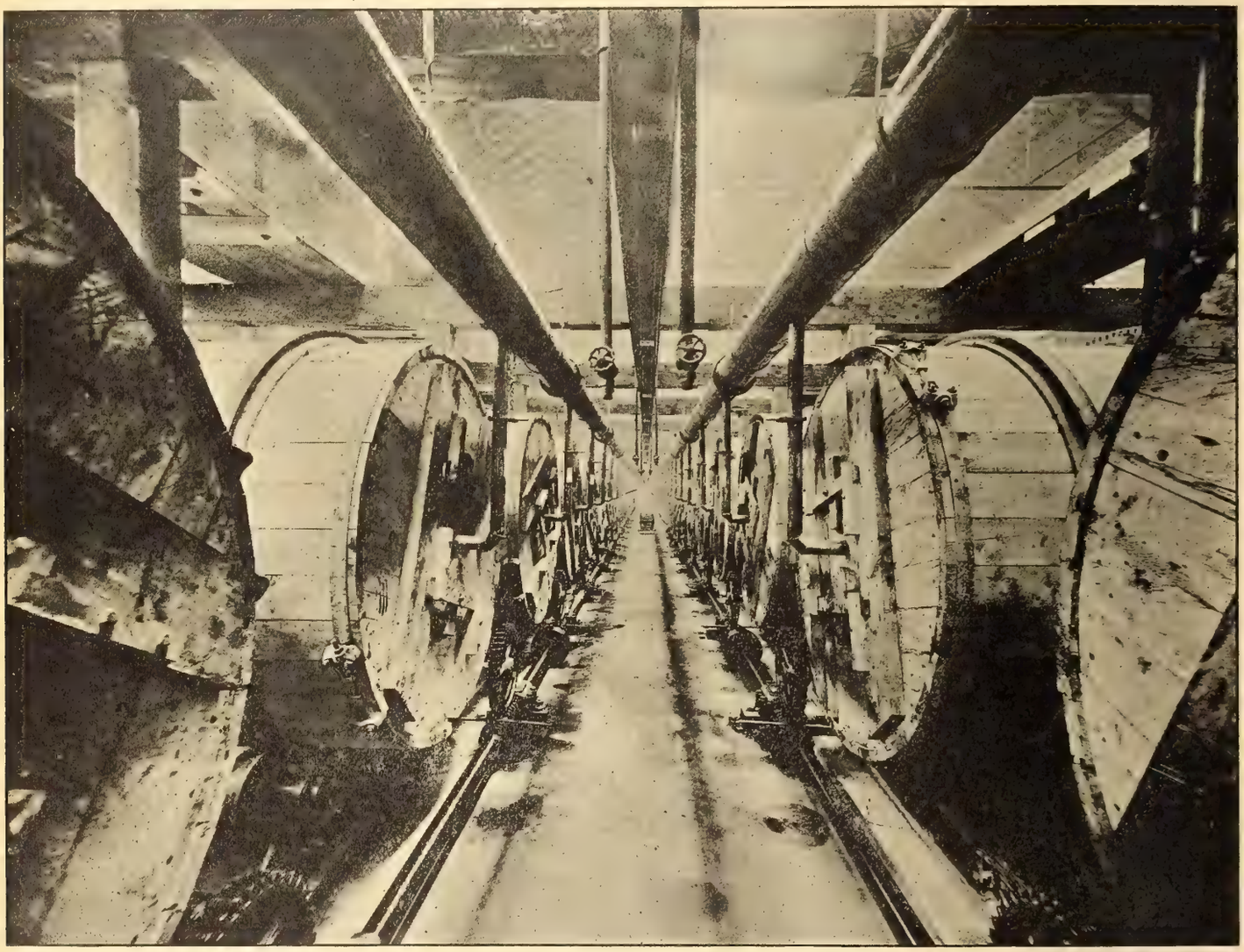
Several months ago mention was made in the MINING REVIEW of a proposal to establish, in Montreal, lead corroding works, which would utilize pig lead produced in British Columbia, and supply the Canadian demand for the finished product, which heretofore had been imported. The first steps in the direction of establishing this industry were taken last October, when a company, incorporated under Dominion laws, was organized. The corporation is known as the Carter White Lead Company of Canada, Limited, the stock being largely owned by the shareholders of the Carter White Lead Company of Chicago. After the organization of the company, a portion of the old C. P. R. shops on Delorimier Avenue was selected for factory purposes, and in October last the work of remodelling these shops and adapting them to the requirements of the new industry was commenced. The installation of machinery and plant was continued throughout the winter months, and, at length, in June, matters were sufficiently advanced to admit of the commencement of corroding operations. In view of the importance of the establishment of this industry, which may well be regarded as significant of the progress that is being made in connection with mining developments in Canada, permission was sought by a representative of the REVIEW, from Mr. P. M. Carter, the manager of the works, for the privilege of inspecting the company's plant. This permission was very courteously granted, and our representative, accompanied by Mr. Carter and Mr. Boand, the superintendent of the Carter White Lead Company of Chicago (and who also occupies the position of consulting engineer of the Canadian company), visited the works during the past month, spending a couple of hours or more in inspecting the various departments, and watching the process in operation.

The factory occupies a brick building extending from the corner of Craig and Delorimier Avenue northwesterly along Delorimier Avenue for a distance of something over 400 feet, the interior dimensions thereof being 400 feet long by 120 feet wide. The first section of the works is at present occupied by 80 corroding cylinders, arranged in four ranks of 20 cylinders each. These cylinders are built entirely of wood, and are 10 feet in length by 6 feet in diameter. They are rotated by means of a spur-wheel and worm gearing, and make four revolutions per hour. Each tank or cylinder is charged with 4,000 lbs. of metallic lead, making a total quantity of lead in process of corrosion, when the 80 tanks are filled, of 320,000 lbs., or 160 tons. These 80 tanks at the present time take up but one-half of the available floor area of the building, and the company intends, as soon as it is possible, to complete the plant by the installation of another 80 tanks, which will put the maximum corroding capacity of the works at 320 tons. The average length of time required for the conversion of the metallic lead into the mixture of carbonate and hydrate, which is desirable, is twelve days,

The New Lead-Corroding Works at Montreal.—Pig Lead from the Trail Smelter ready for "atomizing" in Melting Room.

to which must be added two additional days, which are required, as will be noted in the following description of the corroding process. This makes a total of fourteen days as the average length of time between the filling of one corroding cylinder and the next filling.

The first step in the process is the "atomizing" of the metallic lead. The lead is received in the form of pigs, weighing about 100 lbs. each, and consisting of practically pure lead, the average analysis of the pigs being in excess of 99.7 metallic lead. These pigs are put into a large iron melting kettle, of particular construction, which holds 16,000 lbs., or 8 tons at one melting. This lead is brought into a molten condition in the kettle, and is then discharged from the kettle by means of a jet of steam under pressure. The melted lead flows through a pipe connected with the bottom of the kettle, and the stream of lead, approximately three-eighths of an inch to one-half inch in diameter, in its passage through this pipe is atomized. There is connected to this pipe, in the manner of an inspirator, another pipe connected with the boiler, and through which is blown a jet of steam. The action of this steam on the molten lead is to atomize it, or blow it into minute particles, ranging from dust to perhaps 1-64 of an inch in diameter, and which are carried by the force of the steam jet into a condensing chamber, where the fumes and dust are both collected. The effect of this atomizing is not alone mechanical, but to a certain extent is chemical and oxidizing in its action, the resulting atomized lead showing a very appreciable amount of oxy-hydrates on the surface. This lead, thus subdivided, is raised in cars to a track running over the corroding cylinders, and each cylinder takes a charge of 4,000 lbs. of this atomized lead. After charging the cylinders with the lead, each 4,000 lbs. is treated with a solution which contains 14 lbs. of 28 per cent. acetic acid to about 40 lbs. of water. This solution is prepared separately in a small cask, or tank, running on a trolly on rails between the various tiers of tanks, and connected by a flexible hose to an air-pipe coming from the air compressor, from which tank it is spread over the lead in the cylinders in quantities sufficient to make the whole mass thoroughly moist, and to an extent which has been found by experience to be sufficient. The hand-hole doors are then fastened on the front end of the tank, and rotation is commenced. At the same time carbonic acid gas (CO_2)is blown through the revolving cylinders, to convert the acetate and oxide of lead into carbonate of lead. The generation of the carbonic acid gas, and its method of application is interesting. For the purpose of making as clean carbonic acid gas as possible, Connellsville coke is burned beneath the boilers of the plant, and burned as completely as possible to CO_2. The products of combustion, instead of passing at once into a chimney-stack, and being sent into the air, are exhausted from the boiler setting by an exhaust fan, and passed over bog iron ore or oxide of iron in the form of Fe_2O_3, either hydrated or dry, preferably hydrated. This passing of the gas over the oxide of iron re-



The New Lead-Corroding Works at Montreal.—The corroding tanks or cylinders. These are arranged in ranks of twenty, and are rotated by means of a spur-wheel and worm-gearing.

moves any sulphur in the combustion productions which is partially oxidized into SO_2 or SO_3, and also serves to cleanse generally the carbonic acid from impurities. The exhaust fan forces, as it were, this cleansed CO_2 through pipes which run the whole length of the corroding house, and from these larger pipes the gas is distributed through 2½-inch pipes to the corroding cylinders. The pipe carrying carbonic acid gas enters the axial line of the horizontal cylinder through the front head. The gas traverses the 10 ft. length of the cylinder, and finds its way out to the tall brick stack, through a pipe axially located on the rear head of the cylinder. In this manner the interior of the wooden corroding cylinders is always filled with an atmosphere containing at least 10 per cent. of CO_2. It is particularly undesirable that this CO_2 gas should be mixed with carbon monoxide (CO), and it is one of the trade secrets or manipulations of the process to prevent this as much as possible, and also to get not more than 10 per cent. of CO_2 in the atmosphere which is found in the corroding chamber. Mr. Boand, the expert of the company, was most kind and frank in his explanations of the processes used, but it would be an unpardonable breach of courtesy to lay these details before the public in a printed article.

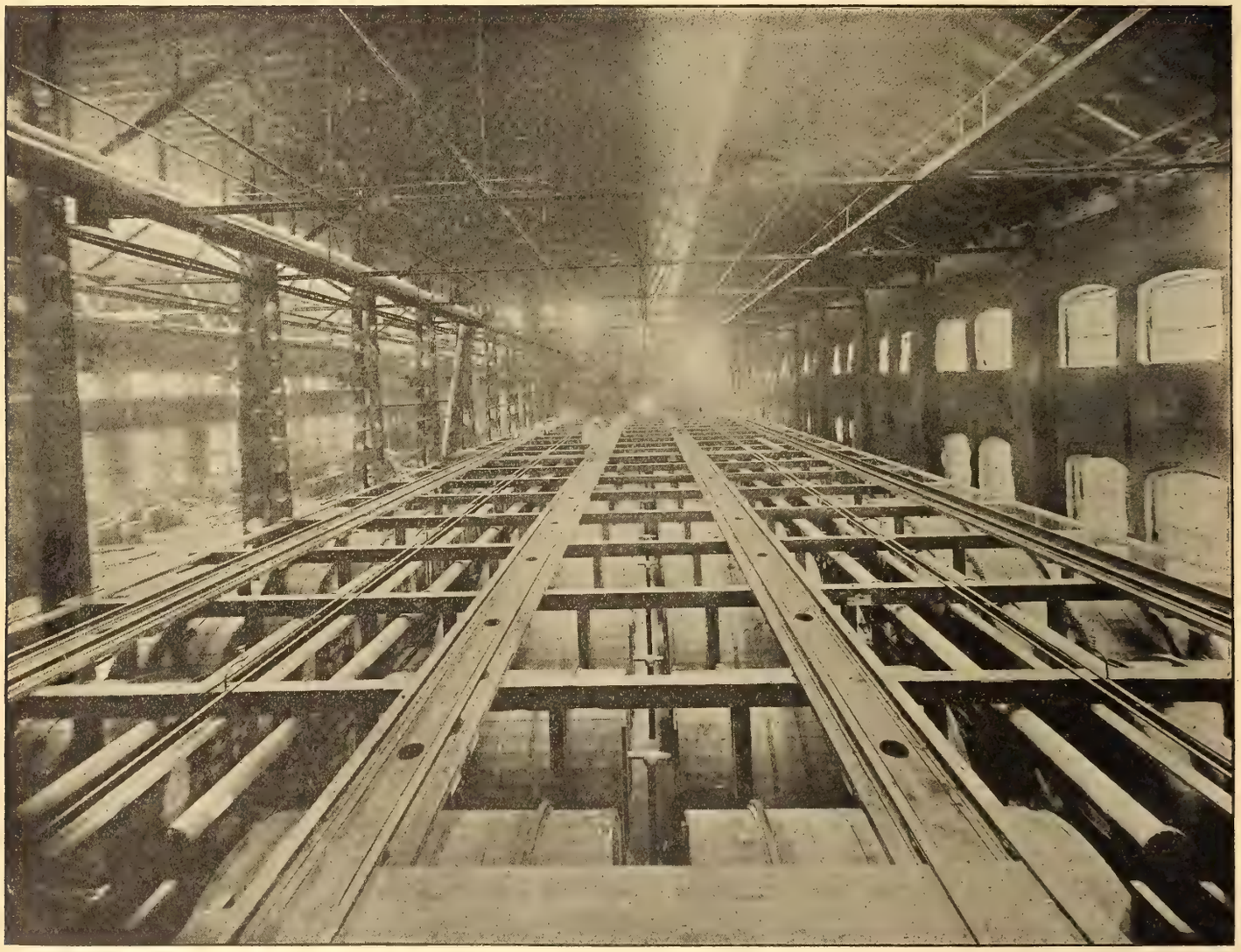
Inside of 24 hours a very considerable amount of heat is generated by the chemical action of the acetic acid upon the metallic lead. From time to time, according to the judgment of the foreman in charge, the hand-holes are opened, and the quality of the mixture inside is observed, and, if too dry, additional water is introduced and the doors again fastened on and the process continued. As a general rule, the heat generated by the chemical action is sufficient to dissipate a large portion of the moisture in the mass, so that the lead requires to be frequently sprinkled with water in order to make the chemical action uniform and speedy. After about 6 days the carbonate and hydrates of lead formed in the cylinder, through the agency of the acetic acid, begin to "lump up," or to make lumps or concretions of considerable size, varying from that of a marble to the size of a hen's egg. The rotation of the machine is then stopped, the contents discharged and taken to an attrition mill or pulverizer, fashioned very much like the old Whelpley & Storer mills of twenty years ago, which breaks up the lumps which have been formed and again converts the whole mass into a granular powder. The charge is again put into the cylinder with a fresh batch of acetic acid solution, and the rotation and carbonization continued for another six days on the average, by which time the lead has been converted from metallic lead into a product which consists (practically) of about 70 per cent. of carbonate of lead and 30 per cent. of hydrate of lead. The time of corrosion thus averages 12 days, to which must be added the one day in the middle of the process required for discharging and breaking up the lumps, and one more day re-

The New Lead-Corroding Works at Montreal.—Moistening the atomized lead with a solution of weak acetic acid.

quired for the final discharging of the completed product. The average consumption of acid liquor is about 1¼ lbs. of the 26 per cent. solution of glacial acetic acid to each 100 lbs. of metallic lead corroded. It may be of interest to our readers to know that the acetic acid used by these works all comes from the Canada Paint Company.

After corrosion is finished, the discharged carbonated products are taken to a wash mill, where the excess of acetic acid is mostly taken out, and the uncarbonated portion of the metallic lead falls to the bottom of the washers through superior gravity and denser physical structure. The white lead which is in satisfactory condition is held, in suspension, in the wash water, and is discharged by overflows to circular tanks in which a reciprocating arm is moved back and forth by machinery, so as to produce an agitation. This agitation is kept up for a longer or shorter period to complete the discharge or washing out of any free acetic acid which may still remain in the product. After the washing has been completed, the agitation is stopped, and the lead and water pumped by means of a centrifugal pump to the highest floor of the factory, to tanks just beneath the roof, from which it is discharged into a series of drying pans, made of very heavy metallic copper, jacketed underneath with live steam from the boilers, and ranged in rows of four pans in three sets of dryers. These copper pans are each 25 feet long, 8 feet wide and 10 inches deep, and are made of 5-32 in. copper of best quality. The capacity of these three sets of dry pans is 35 tons per week for the three, or about 3 tons per week for each pan. Here the moisture is thoroughly driven off by the heat of the steam, and when the tanks are dry the circular frame work in which each set of four tanks is mounted is slowly revolved on friction wheels, and the whole mass of dry white lead is discharged by gravity into a large tank beneath the drying pans, from which it is taken and passed automatically through a weighing machine, and packed in barrels, which contain from 550 to 600 lbs. of the best quality of white lead which is found on any market to-day.

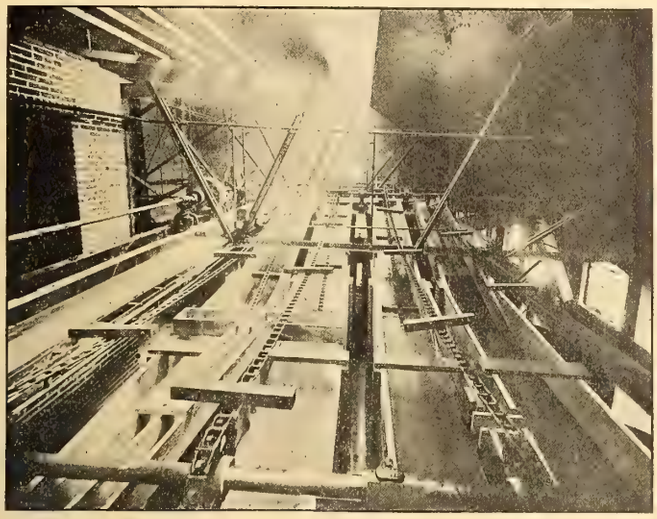
In the working up of metallic lead into white lead, there is a remarkably small loss, and we say this having full knowledge of the increase of weight which occurs on converting metallic lead into the mixture of carbonate and hydroxide, which constitute the commercial white lead.



The New Lead-Corroding Works at Montreal.—View of the corroding department, showing system of tracks above cylinders.

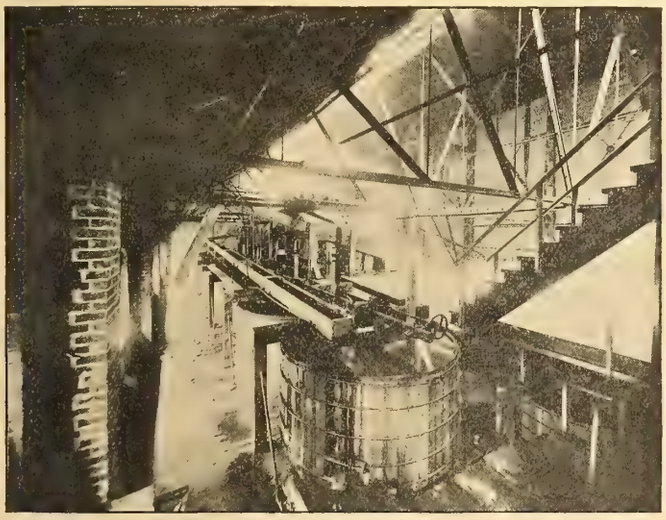
The engine room is equipped with a 300 h.p. Brown engine; a battery of two Lawrie boilers, equipped with automatic stokers, and two gas boilers; an Ingersoll-Sargeant air compressor, and a plant for generating electric light. Adjoining the engine room, a large store room is now being made ready, workmen being engaged in laying cement for the floors. The pig lead will be discharged here from the cars, which come direct by C. P. R. from Trail, and are run into the yard over a spur. When the works are in complete operation, the handling of both the raw material and the finished

product will be largely automatic, and in this regard mention should be made of the very ingenious device utilized for packing the white lead in barrels ready for the market.



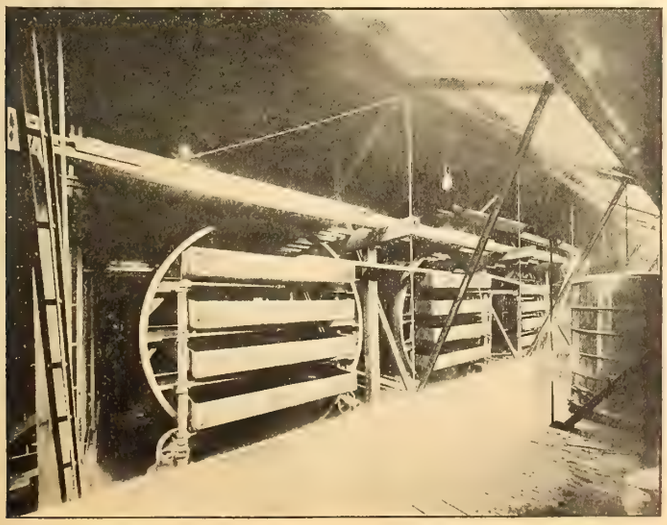
The New Lead-Corroding Works at Montreal.—The elevator system by which the discharged carbonated products are conveyed to the waste-mill.

The present consumption of white lead in Canada is about 7,000 tons per annum, and it is the intention of the Carter



The New Lead-Corroding Works at Montreal.—The tanks in which any remaining acetic acid in the lead is freed.

Company to lose no time in equipping the works to enable them to fully supply all Canadian market requirements. The



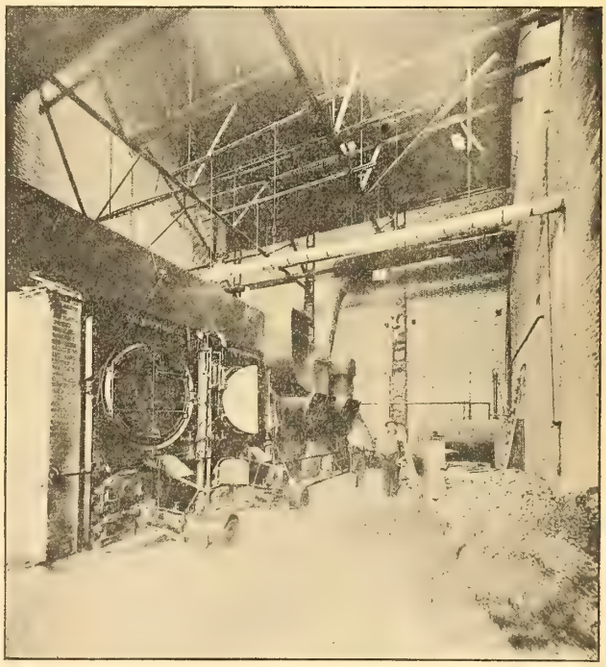
The New Lead-Corroding Works at Montreal.—The copper drying-pans.

plant, in fact, has been so designed that it will be no difficult matter, when required, to increase the equipment so that a production up to 15,000 tons per annum may be easily maintained.

The works actually began corroding in the latter part of June of this year, so that the plant has not yet been a full month at work. Our illustrations give views of the corroding house, of the settling tanks, and of the wash mill apparatus and other departments, to which allusion has been made. The industry began under tariff conditions which imposed a duty

The New Lead-Corroding Works at Montreal.—The Engine Room.

of only 5 per cent. on dry imported white lead. As these lines are written, we are glad to note that the Dominion Government has duly recognized the importance of this new Canadian



The New Lead-Corroding Works at Montreal.—The Boiler Room.

industry, and has granted adequate protection thereto by raising the duty on imported white lead to 30 per cent. With the excellent quality of the product now turned out by the Carter White Lead Works, and the abundant supply of pure metallic lead furnished by the refinery at Trail, B.C., Canadian lead users and consumers may be satisfied that they are getting the best article known to the world under the designation "white lead."

MINE SURVEYING AS CARRIED ON AT CENTRE STAR MINE, ROSSLAND, B.C.*

(By L. Heber Cole, McGill University, Montreal.)

INTRODUCTION.

The methods as described in this paper are those employed by the Engineering Staff of the War Eagle and Centre Star Mining Companies, as observed by the writer who was a member of the stuff during the summer of 1904.

The manifest difficulties in the way of using the actual mine surveys for illustrating the paper, have led the author to assume an imaginary mine having but a general resemblance to the Centre Star. All of the maps in the present paper and the detailed references in the text refer to this imaginary mine, which may be briefly described as follows:—

Ore body consisting of two intersecting veins A. and B.
A. striking N. 80°E. dip 67° to N.
B. " N. 80°W. " 67° " N.
Both veins are cut by a reversed fault which strikes N. 25°E.—dip 90°—throw 25 ft. to North.

The mine is assumed to have been sunk to the 5th level, with stopes on 1st, 2nd and 3rd. The shaft is located in the centre of outcrop of vein No. 1 and dips 65° bearing N. 10° W. This comprises a very simple mine but serves as a means of illustrating the methods employed.

I.—SURFACE WORK.

Since the surveying work carried on in connection with the mine is principally underground, the methods used in surface surveys will only be lightly dealt with.

For location work, a transit, with stadia cross-hairs is used. By this stadia method all buildings, etc., are located for plotting on the surface map. When a point is required to be located with any degree of accuracy, or when it is only a short distance from a station, as at the mouth of a tunnel, the work is carried on with a transit taking both horizontal and vertical angles and by measuring the distance on the slope with a steel tape.

As the prospecting was commenced by a tunnel, the surface workings were easily connected with the underground surveys. These were checked by sights down the shaft, which is at an angle of 70°.

The levelling is done with an ordinary Y level with a target rod or else a telescoping rod reading to $\frac{1}{100}$ ths of a foot. The line is generally levelled back to insure accuracy. All level notes are reduced to sea level.

Accurate bench marks were established at the mine by running a line of levels from the mine to the bench mark on corner of Bank of Montreal, in Rossland, which has been accurately located above sea level by the Canadian Pacific Railway.

II.—UNDERGROUND WORK.

The transit used in ordinary work has a horizontal and a vertical cross hair and complete vertical circle. (Two transits are used, both Buff and Berger,—one with and one without stadia. The one without stadia is preferable as there is no chance then of getting mixed on centre wire.) The compass needle is attached but is never used except as a rough approximate check. The transit telescope is never plunged. The rod used for contour work is five feet long and is brass shod at each end and graduated at every foot. The tapes are 50 and 100 feet tapes of steel ribbon, graduated to feet and 10ths of feet.

All bearings are worked out from the azimuth of the back sight, thus doing away with the use of the needle. Sights are taken on plumb-bob lines or on nails, and the transit read to minutes. Each angle is doubled so as to check reading.

571 drift. West

Date 1905.	ADVANCE: Since last measurement Conc	D.P	Since 1st of Month Conc	D.P.	For 30 days period Conc	D.P	Total since commencement	Date given to payroll	MEASURED FROM: feet		feet		on	by
Jan 10	0.00		0.00		0.00		0.00		0.00	0 78			1/11	Brown
" 13	12.00		12.00				12.00	1/14	12.00	"		"	1/14	"
" 20	22.00		34.00		34.00		34.00		34.00	"			1/21	Smith
" 30	40.00		74.00		40.00		74.00	1/31	74.00	"	600	679	1/31	Brown

Notes are kept in a standard x-section book Size 7"x5" (X-sect 10x10 to inch)
Conc = men working on Contract D.P. = Men working on Day's Pay.
Note book ruled to above form as required.

FORM I.
Measurement of Advance

The stations are placed in back of drifts or in caps of square sets of timbers. When placed in backs, a hole about one inch in diameter is drilled at the spot where the station is required and a wooden plug is driven in flush with the back. This plug is from two to three in. in length. Into this is driven a horse-shoe nail with a tag on which is stamped the number of the station. The horse-shoe nail head is pierced so that a wire can be passed through it. A copper wire is then hung so that it can be conveniently reached from the floor of the drift.

(Form II.)

Advance in _____ Mine.

For _____ Ending _____ 190__

Place	From	Total since commencement	Advance	Remarks

_____ Surveyor.

* Student's paper, presented for prize competition. and awarded first place by the judges. Transactions Canadian Mining Institute.

To illuminate the plumb-bob string, a piece of tracing cloth about four by three inches, mounted on a wire frame is held between candle flame and string. To illuminate the cross-hairs in the telescope, a candle is held a few inches in front of object glass and a little to one side. The plumb-bobs used are ordinary brass plummets with long tapering ends. No plumb-bobs with lamps are employed.

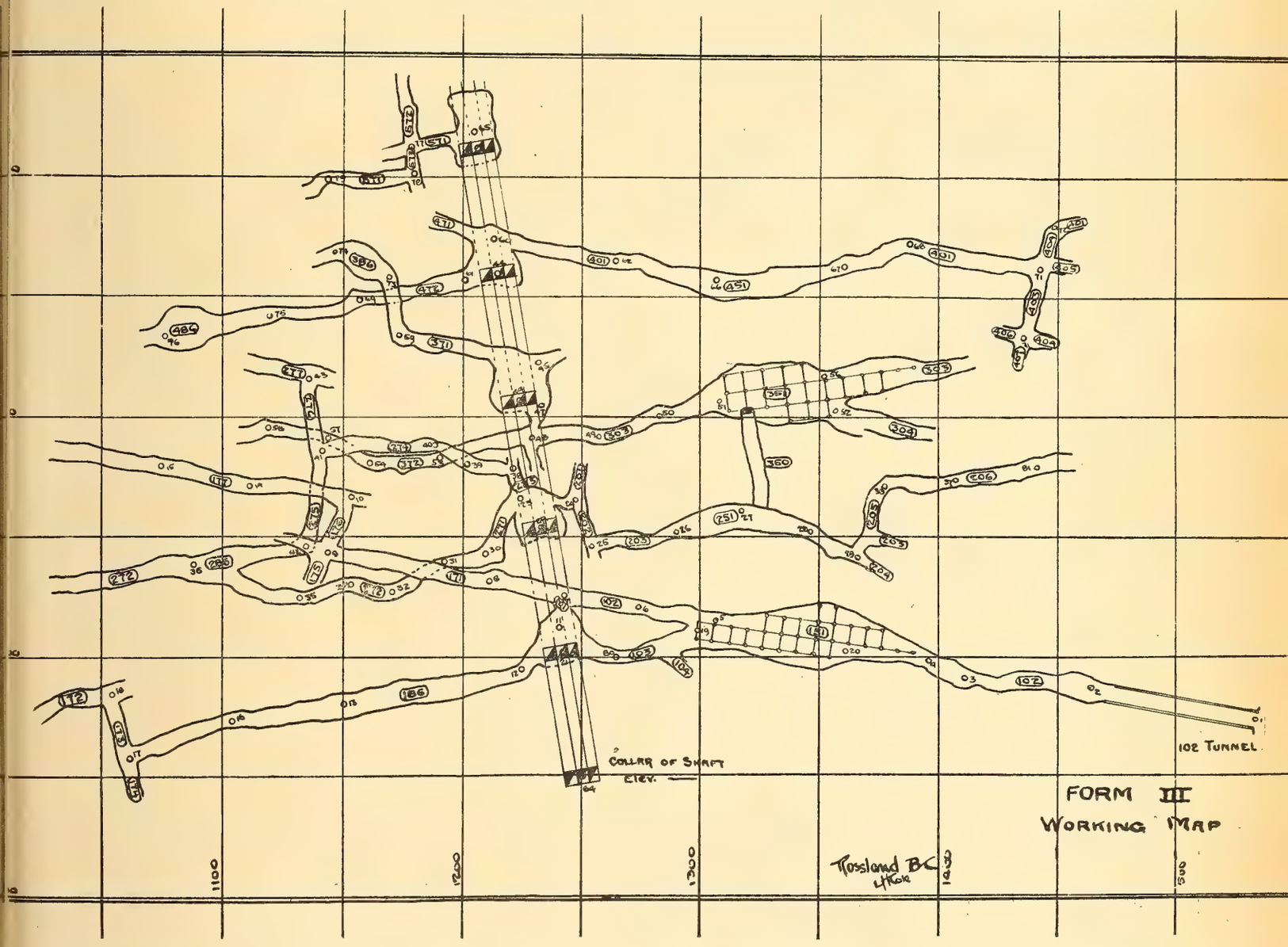
The transit tripod has telescope legs and is firmly built to withstand underground use.

When moving from one level to another the transit telescope is covered with a canvas bag.

A button is put on each plumb-bob string, which will slide up and down, and which can be set at any height required.

month. It is carried out as follows. (See Form III, working map, 4th level west of shaft.) The transit, tape, plumb-bobs and rod are used. The instrument is set up under station °75.

Station °76 having been put in and plumb-bob hung, the horizontal plate of transit is placed to read 0° and clamped to vernier. A back sight is then taken on the plumb-bob string on Station °69. The vertical axis is then clamped to plate and vernier let loose. A fore sight on Station °76 is taken and vernier clamped and read. The vertical axis is then loosened and the operation is repeated, thus doubling the former reading, if work is correct. If these do not agree, the angle is read a third time. The vertical vernier is set to read 0°, thus making



Measurements of Advance.—The progress made in drifts, winzes and raises is measured on the 1st, 11th and 21st of each month. This is done roughly with the steel band-tape. The distance is measured parallel to sides of drift. Measurements are generally taken from some station if possible, or else some mark located on a previous measurement. This measurement is taken in connection with the calculation of the pay given to men when working on contract. Form I shows the method of noting these measurements. Reports are made out each month and handed into the general office. (See Form II).

Survey of Advance.—The advance made in the mine is the progress made in the drifts, cross-cuts, etc. The advance is surveyed accurately for plotting on the 1st and 15th of each

telescope line horizontal. The button on plumb-bob string is set in this horizontal line. The horizontal distance between the centre of the telescope and button is then measured and checked two or three times. The height of instrument above or below Station °75 is measured, as is also the height of the button below Station °76. This gives a means of obtaining the elevation of Station °76. If button cannot conveniently be set on the horizontal line, it is set in plain view from telescope and the angle of inclination is measured and the distance on a slope is determined. Height of instrument and height of button are taken as before and from these the H.D. and V.D. are calculated. The sides or contours between Stations °75 and °76 are next determined. The telescope is still sighted on Sta-

tion °76 and the rodman holding o inch end of tape and rod advances to instrument. Where irregularities in drift occur, he has his candle lined in by transit and he gives distances to L. and R. to the nearest ½ foot. At the same time, distance from instrument is read from tape by instrument man. The L. and R. given are always the L and R. of instrument man.

The instrument is then set up under Station °76 and B. S. taken on Station °75, similar to preceding work. The F. S. is taken on candle flame held in centre of drift. The angle is not doubled since sight is not on the station. The height of instrument is not measured. If, as in this case, the drift widens out, extra sights are taken on the sides of the drift and distances measured to locate contours and H. angles are read. When work is required to be surveyed up to date, and a station in the proper place would be blown out by next blast, a sub-station or temporary nail is placed in ties or in board and this is used to survey to face. These are not numbered. For method of keeping the Notes, see Form IV.

486 Drift. Jany — /05 Surveyed by — o —

Station	H.I.	Angle	Bearing	Vert. Ang.	Slope	Vert. Dist.	H.P.	Hor. Dist.	REMARKS
T5	3.11	178° 00'	S 78° 00 W				3.41	109.6	To station °76 Plug in back 486 drift L — R
BS 69		356° 00'							
								60.0	5.0 4.0
								48.6	6.0 3.5
								20.2	4.0 3.0
T6	3.11	179° 00'	S 77° 00 W					10.3	To face 486 Drift 3.0 3.0
BS. 75								7.2	3.0 4.6
		27° 00'	S 75° 00 E					30.0	To points around
		45° 00'	S 57° 00 E					27.7	do
		95° 00'	S 7° 00 E					9.2	do
		300° 00'	N 18° 00 E					22.7	do
		330° 00'	N 48° 00 E					29.5	do FORM IV

Setting Directions for Drifting, etc.—When the direction of a drift is required to be changed or a direction is needed for a diamond drill hole, a course is laid out by the survey department for miners to work from. This course generally consists of a couple of plugs in back of the drift from which strings can be hung to obtain line. The plugs are located by the transit. The plug nearest the station is located like a sub-station and the other plug is placed in line when telescope is set with the bearing required.

The Notes (calculations and bearings for the above sights) are worked out beforehand.

D.D. Hole. 102 Drift Jany. — /05. Surveyed by — o —

Station	H.I.	Angle	Bearing	Vert. Ang.	Slope	Vert. Dist.	H.P.	Hor. Dist.	REMARKS
3.	3.11	135° 00	S 85° 00 E	4° 25'	110.7				To sub-station on end of drill rod
BS. 4.		210° 00							
Sub.	4.25	75° 00'	N 10° 00 W	10° 27'	18.3				To collar of hole
BS. 3.									
									(Bearing of hole)
									FORM V

Location of Bearing of Diamond Drill Holes.—The bearing and inclination (if any) of the diamond drill holes are determined accurately by means of the transit. When the drill is in position, and the rods are in the hole, these have a direction the same as the hole. They are extended as far as possible back into the drift. A sub-station, or mark on the free end of the rods, is located from the nearest convenient station. For illustration take location of D.D. No. 1, 1st level East No. 102 drift. The sub-station on the rod is located from Station 3 since Station 2 is too close. The instrument is then set up over the mark on the rod and sight taken to centre of collar of hole. The bearing of this sight is the bearing of the hole. When the inclination is required, the vertical angle of inclination to collar is read as is also the height of instrument above sub-station. The holes are generally horizontal. When surveyed, when drill is not in position, a long rod is placed in hole. Notes for this hole are to be seen on Form V.

Location of Square Sets.—The survey of square set in the stopes is carried out in the following manner. Form III. (Working Map) 1st Level East, Stope No. 151.

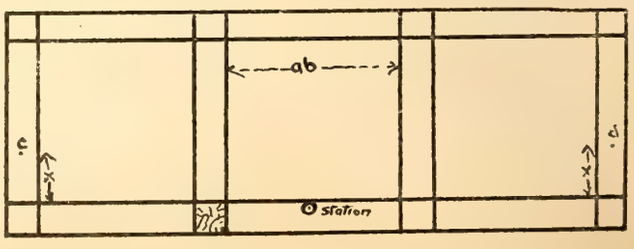
Transit is set up at Station 5. Back sight taken from Station °6 and Station °19 is located in ordinary way. Station °19 is placed in centre of a cap of one of the square sets at a measured distance from post on hanging wall side of it. This measurement is made from centre of post. Station °20 is then placed similarly in cap of square set as many sets away as possible. Transit is then moved to Station °19 and Station °20 is located. The bearing thus obtained of line from Station °19 to Station °20 is the bearing of the square sets in that scope. A rough sketch is taken of the square sets and the distances to walls taken so that contours may be obtained. The form of notes and method of keeping them is given, in Form VI.

151. Stope (Location of Sq Sets) Jany. —/05. Surveyed by — o —

Station	H.I.	Angle	Bearing	Vert. Ang.	Slope	Vert. Dist.	H.P.	Hor. Dist.	REMARKS
5	4.11	320° 00'	S 50° 00 W				1.75	9.73	To station 19 nail in cap 2' to footwall from centre of post Q 37
BS. 6		280° 00'							
19	2.90	30° 00'	S 70° 00 E	(Bearing of Sq Sets)			2.91	6.30	To station °20 nail in cap 2' to footwall from centre of post Q 46
BS. 5		60° 00'							
									FORM VI

Survey of Stopes.—When stopes are of a width of 15 feet and over square set timbers are used; the stope is then surveyed as described under Section 2 of square sets.

Survey of Narrow Stopes.—The contours of these are located in the manner of a drift or cross-cut. A longer contour rod is used. For the long section map, the highest point in the back is located.



Shaft Surveys.—A station is fixed in football plate on centre line of compartment, centre compartment if there are three. (Centre is obtained by halving ab.)

Instrument is set up at this station and the dip and direction set off on it. Every fifth set of timbers is set by the instrument.

The set to be checked is measured as follows:—

Distance a.b. is measured on hanging wall plate and footwall plate. These distances are halved and centre points marked by small nails. A line is stretched between these two nails and this line will correspond with the vertical hair of the telescope if the set is in the correct position. This checks the side displacement. Then the distance of the instrument (axis of telescope) from the footwall plate is measured on the outside posts as in sketch and nails put in at c and d. A line is stretched between c and d and line will correspond to centre horizontal hair of instrument if set is correct. This checks running into the hanging wall or footwall. Intermediate sets are checked by the rodman holding a rod upside down against footwall plate and this should read distance "x." And again, when held against side posts of centre compartment the reading with the vertical hair should be ½ ab.

III.—OFFICE WORK.

The notes taken on surface or underground are computed as soon as possible. Only for stations are the N. and E. co-ords worked out by traverse tables. All other points are plotted by their distance and bearing. (See Form VII.)

Note Books.—Stope books are kept which are worked up twice a month. (See Form VIII. for illustrations). A page is devoted to each floor. These books are ruled so that the spaces represent the distance between the square sets posts in the mine to the same scale that the working map is plotted to. All work is done first in pencil and it is not put in ink till the floor is completed. Each square set is given a number and a letter. The letter tells in which row it is at right angles to vein and the number what line parallel to vein.

486 drift. —— Mine. Note Book 11.-727. 1/16/05.

B.S. Set Up	Azimuth	Bearing	H.D	D.E	Calculations		⊙	Co-ordinates N.	Co-ordinates E	Elevation
					E	N				
69	260° 00'				91.8	20.8				
75	178° 00'				8.803	1.971	75.	984.00	1139.00	720 00
	438° 00'			+3.41	.489	1.04		- 22.78	107.09	66
	180°			-2.75	109.892	22.775	76	961 22	1031 91	720 66
	258° 00'	S 78° 00' W	109.6	+0.66						

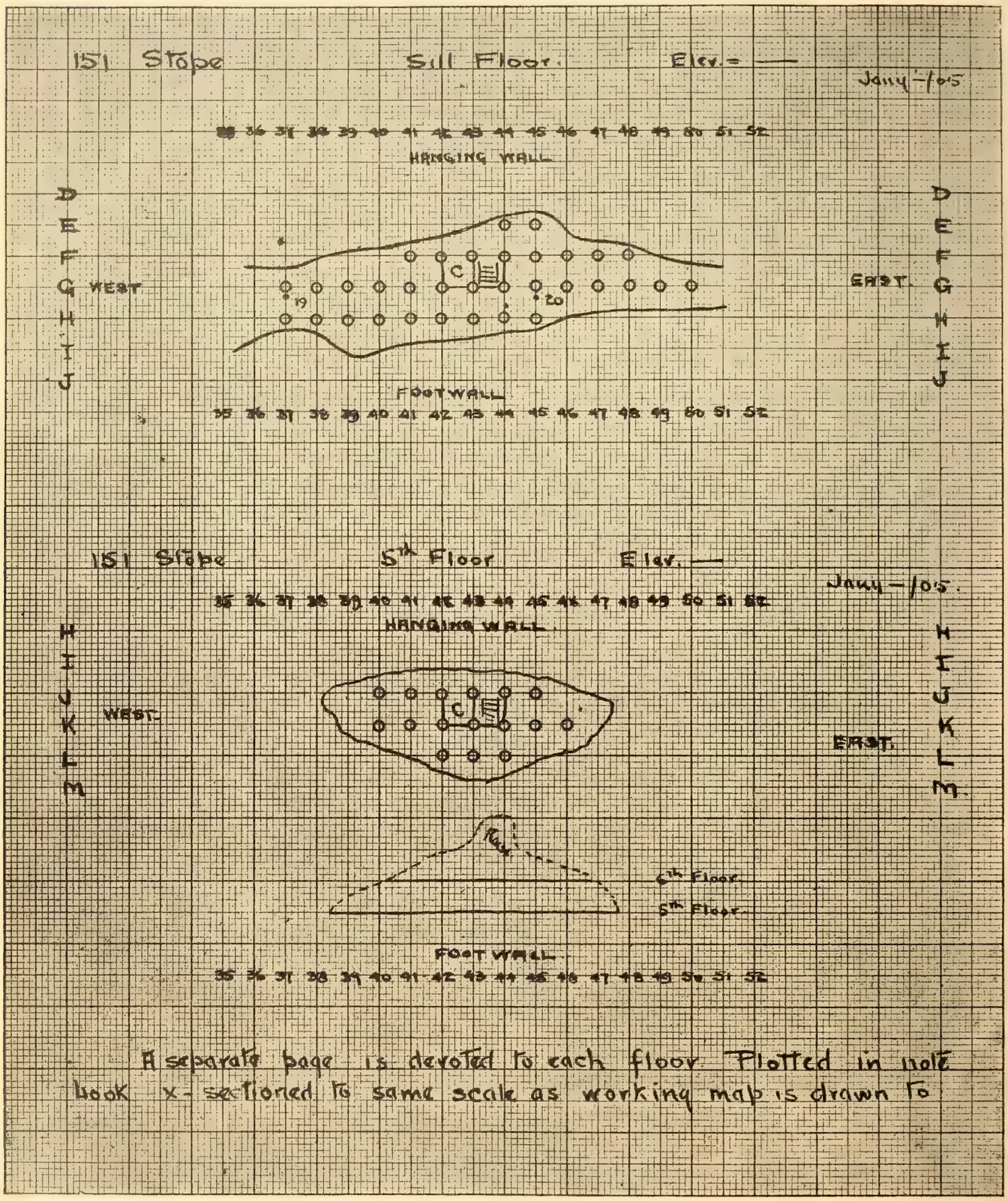
This is worked in pencil and is repeated on a second page as check. Only stations co-ords. are worked out For other points the bearings only are calculated. LR Gurden's Traverse Tables are used.

FORM VII

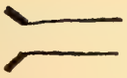
Ledger.—When there is no doubt that a working place will be permanent, all the notes for that place are copied under their proper level in a ledger. A sample leaf is here shown (Form IX). This book is indexed so that all notes that have ever been taken for a certain place may be referred to together. If any doubt remains the original notes themselves may be looked up very quickly from their reference number. A loose leaf ledger is kept while there is work still being done in a drift, and by this means changes may be made comparatively easily.

(FORM IX.)

B. S.	STATION	HOR. ANGLE	AZIMUTH	BEARING	H. DIST.	DIFFERENCE OF ELEVATION	COORDINATES		ELEVATION	H. G. BELOW STATION	REMARKS	REF.
							NORTH	EAST				

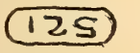

151 Stope Sill Floor. Elev. —
Jany-1905
HANGING WALL
D E F G H I J
WEST
EAST
FOOTWALL
151 Stope 5th Floor Elev. —
Jany-1905.
HANGING WALL.
H I J K L M
WEST.
EAST.
6th Floor.
5th Floor.
FOOTWALL.
A separate page is devoted to each floor. Plotted in note book x-sectioned to same scale as working map is drawn to

Collar 3 compartment shaft

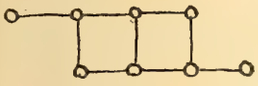

Level station 3 compartment shaft.

Single compartment shaft.

Square set timbering.



Number of working.


Station or survey.

Ore chute.

Mouth of tunnel

Timbering on long section map.

Station Indexes.—An index is kept of all survey stations located in the mine and on the surface in connection with it. This index gives the place and date of location, N. and E. coords, the elevation, the reference to note book in which notes of location are to be found and what kind of station it is; whether it is a plug in back or cap of square set, etc. If a question arises about any station it is looked up in this index and all particulars are at hand.

Conventions.—The usual appliances and instruments of a draughting-room are used. The protractor is one with a vernier reading to minutes made by Gurley.

Several 6 foot steel straight edges are employed. Ruling pens made by Altneder are used. Higgins' Inks and Winsor & Newton water colours are made use of. The conventions used on all the maps are as follows:—

Surface Map.—A map is kept of surface work and on it are plotted all the surface stations and boundaries of the claim. The lines of contour are plotted from the detailed levels taken of the claim. All mine buildings and roads and all tracks of C. P. R. are shown on this map as are also the mouths of the tunnels. This map is plotted on scale smaller than that of the underground workings. Ordinary conventional colours are used for the buildings, etc.

The Working Map. (Form III). This is the most important map in the whole mine. On it are plotted all the underground workings in plan.

This plan is drawn to a conveniently large scale. Each level is coloured a different colour so as to be readily distinguished. Every survey station is plotted and all the working places are numbered to facilitate reference. The sill floors of square set stopes are plotted. Only horizontal workings are represented, except raises. The plotting is carried on with a parallel ruler and the protractor before mentioned.

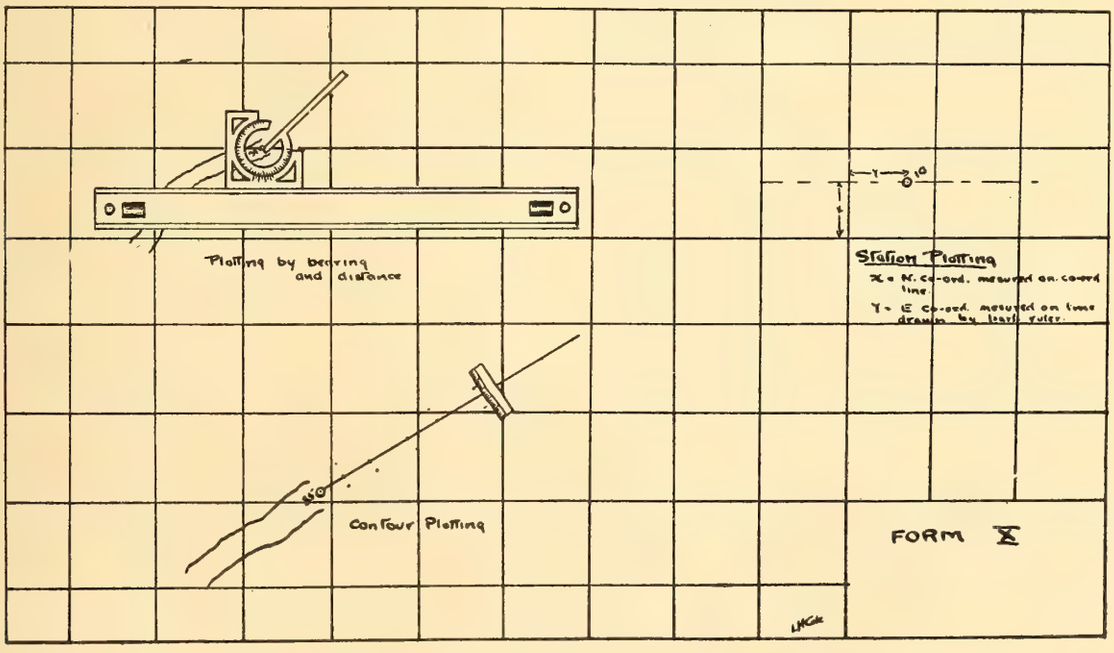
The map is ruled into 100 inch squares, with sides N and S., and E. and W. All plottings are made from these lines. These co-ord lines are numbered; the intersection of the two lines o — o being taken off the claim to S. W. so that no difficulty will arise by the co-ords of a point being negative. These numbers increase to the North and to the East.

The notes are plotted as in Form X.

Long Section Maps. (Form XI.—These are made in two ways:—Either (1) On the dip
or (2) Vertical.

1.—On the Dip—

For this section a plane is generally chosen parallel to the average dip of the vein. The advantages of this are



(1). The actual slope measurements taken in the mine can be plotted on the section map without reduction.

(2). In calculating the cubical contents of stopes, etc., measurements can be taken direct by scale from this section.

II.—Vertical—

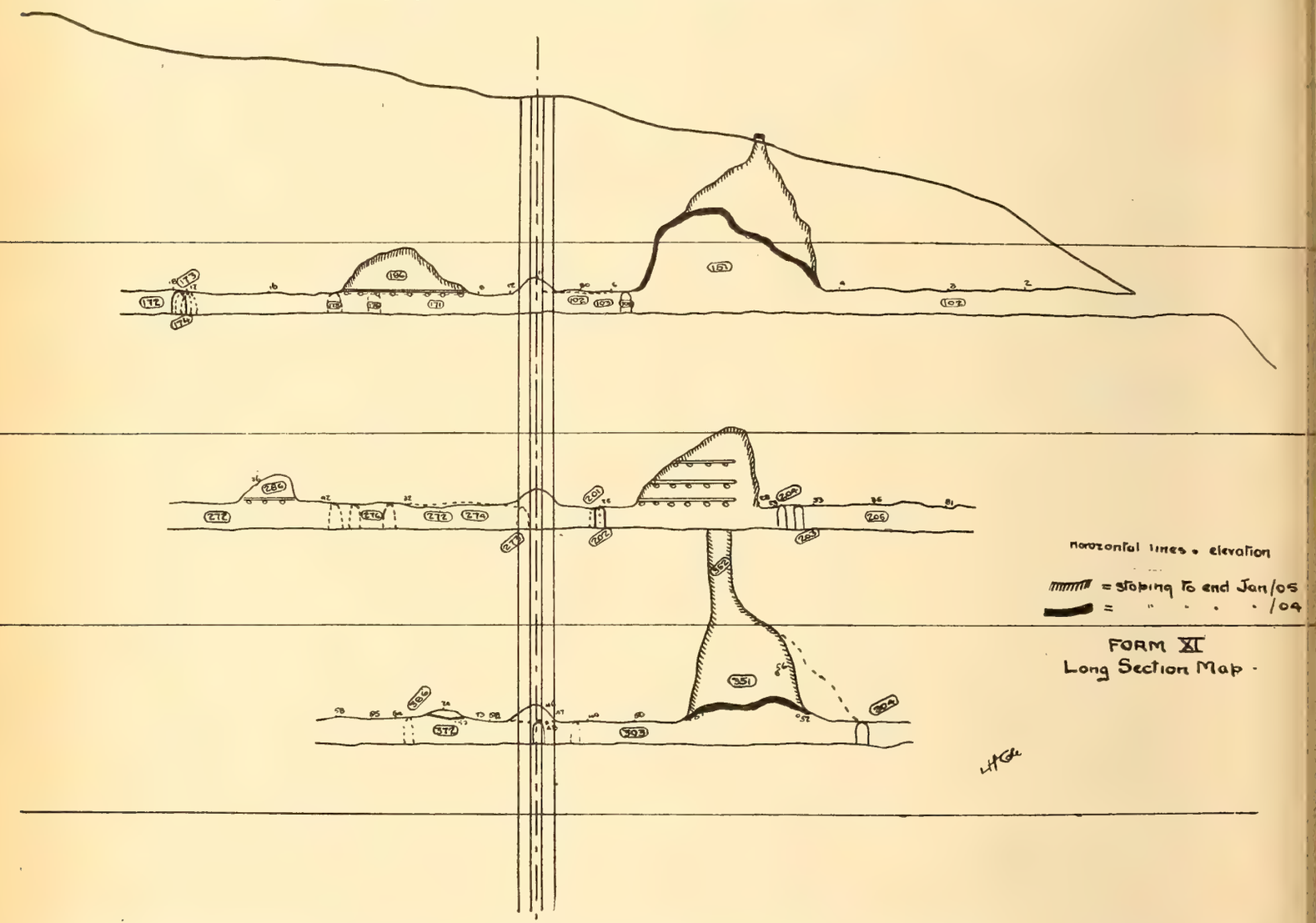
This is a vertical plane generally through the strike of the vein.

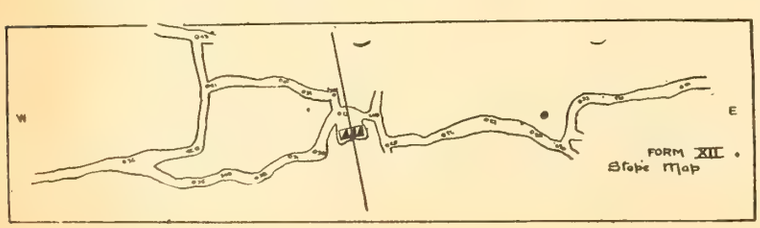
(1) If the vein is very irregular in dip, the above advantages do not hold and then the vertical plane is used.

(2). If there be more than one vein and these at different

dips, by plotting these on the vertical, a direct means of comparison is established as actual elevations are here indicated.

For purposes of illustration three levels of a long section map on a vertical plane along strike of Vein No. 1 have been worked up. On this map all elevations can be plotted directly without change. For the horizontal distances, these are projected from distances on main map. Tracings are made for each level. These tracings are called stope maps (see Form XII). On these are located the bearings and H. D. of all points plotted in the stope. This is done in pencil so as to easily erase it. Then the tracing is lined up by central line on long section map either above or below the stope on which you are working. Parallel lines are drawn through the plotted points to the line of the shaft. The elevation of each point is located on its corresponding line and points so obtained are joined. The stope is thus completed.





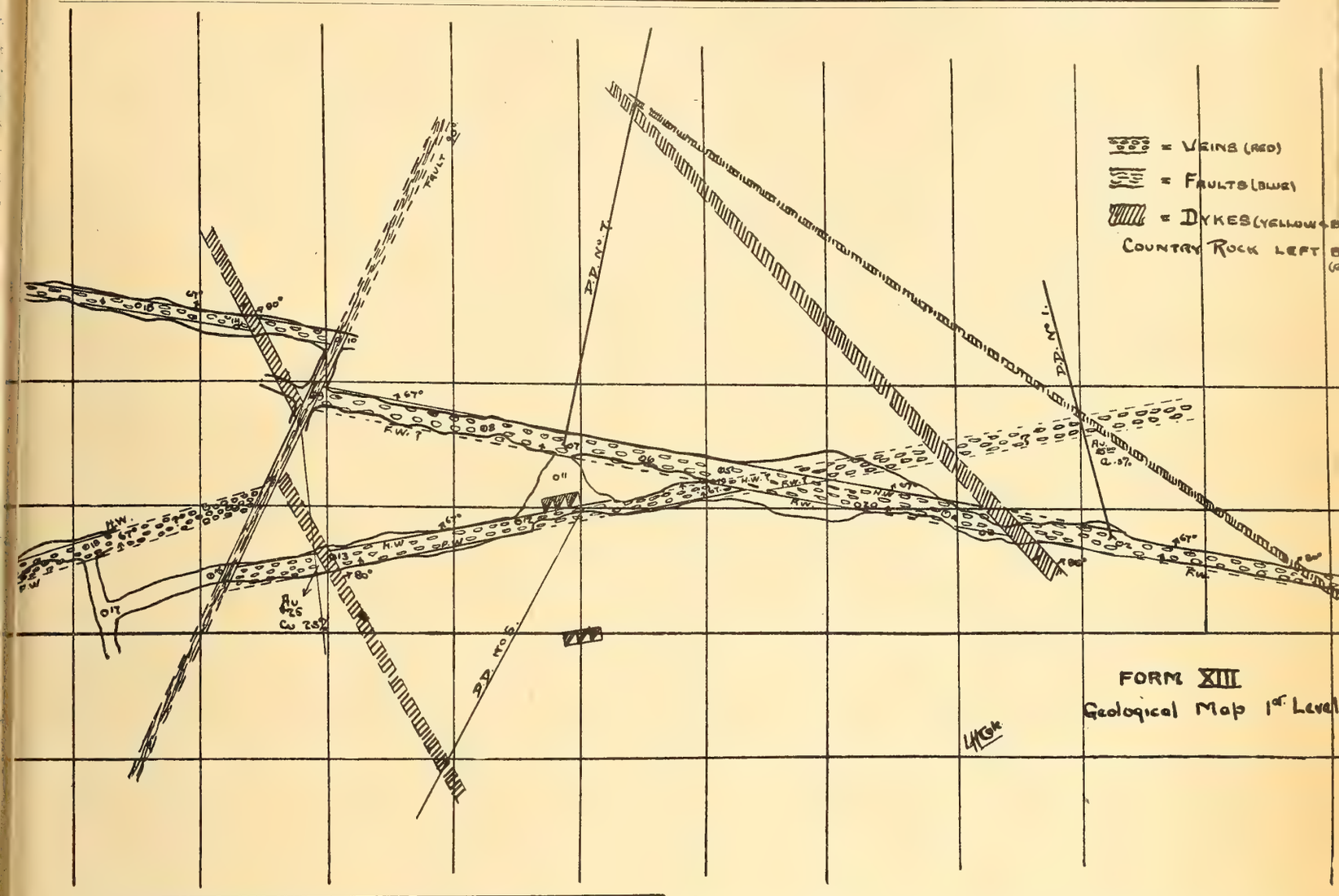
In the case where stopes are located from the square sets the work is much easier. The distances are measured perpendicular and located.

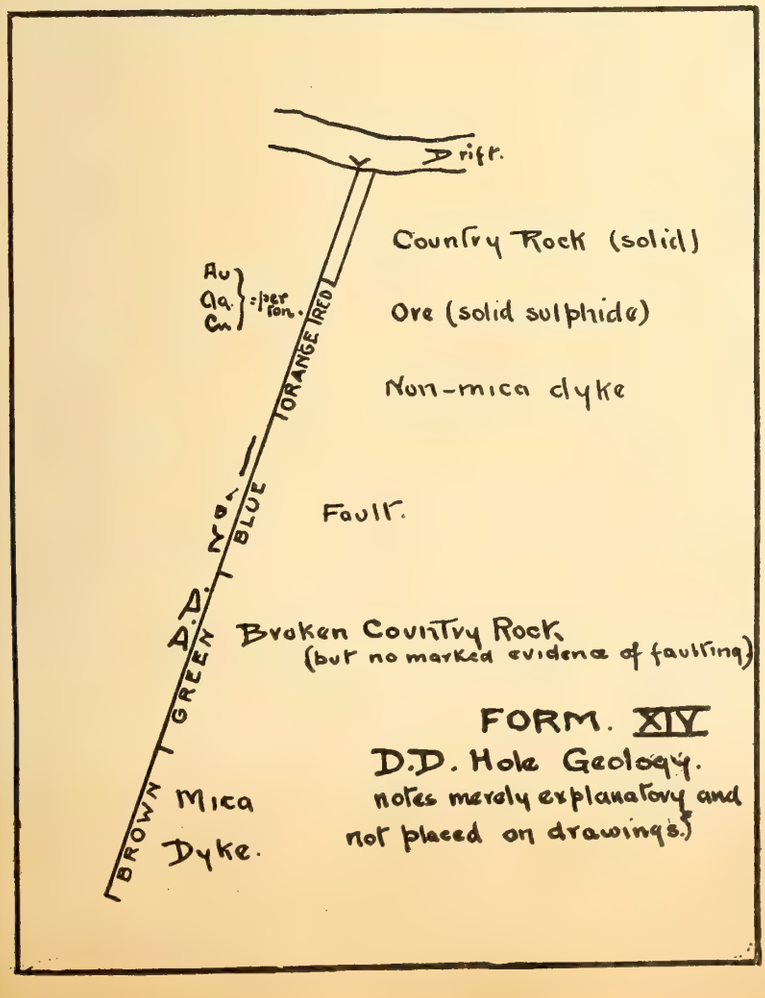
On the long section map certain colours are given to certain levels. The main drift on each level is given a certain colour and when one projection falls on another, the one further away is put in dotted lines and a different colour. The cross-cuts projecting towards the vertical plane, i.e., into foot wall of vein are put in heavy continuous lines while those into the hanging wall are dotted. All stations are marked on this map in the colour of the drift in which they are located. The number of the working is also put in in same colour as that working. A line is put down centre of shaft in red to line up stope maps on. At end of each year the outline of stopes are put in ink (a different colour for each year) so that the amount of stoping done during the year may be seen at a glance. Lines of elevation are ruled across the map in yellow or purple ink at every 100 feet of elevation for facility in working.

When the long section is taken on the dip or plane of the dip of the vein, a table is worked out for values from 1-100 ft. on the vertical and their equivalent values on the plane chosen. This means the saving of a lot of time in reduction of elevation of points.

Geological Maps.—The particular geology of each level is worked up by the engineers and is plotted on tracings from the working map. Each level has a separate sheet. The work underground is plotted to scale on small vellum sheets about 10 by 8 inches. Each of these has traced on it a portion of the level. Thus there are a number of these sheets to each level. They are made to overlap each other. This is worked up twice a month.

When a small sheet is completed it is placed under big tracing and geology is traced through. When level is completed it is carefully examined and details are filled in where





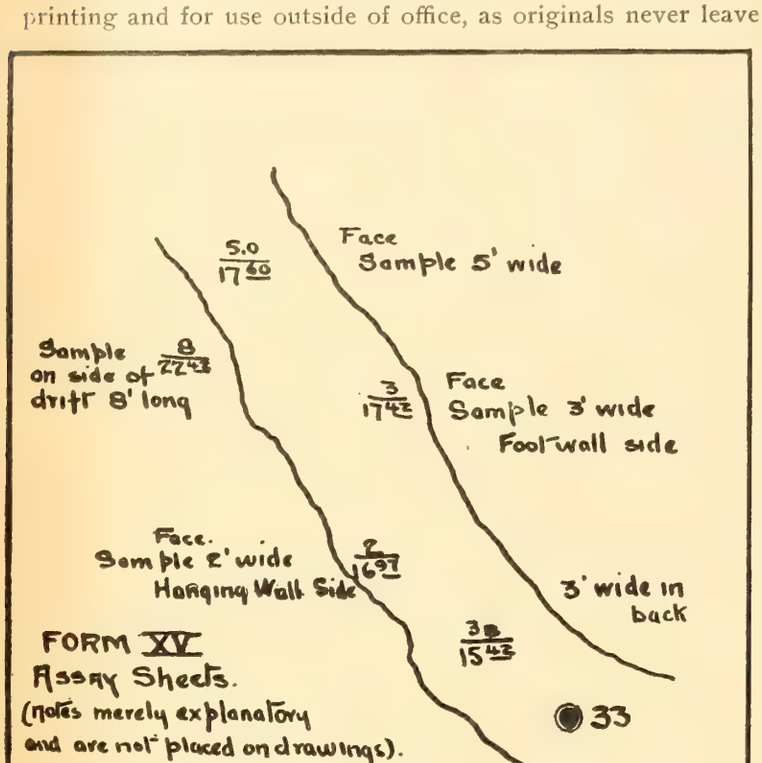
intervening geology is obvious. The geology is put in with coloured pencils. Certain colours are used to represent the different geological structures, thus the [red] = veins, the [yellow] = non-mica dykes, the [brown] = the mica dykes, the [green] = the country rock, the [blue] = the faults. The hanging walls and foot walls of the veins are always marked H. W. and F. W. The dip of veins, dykes, etc., are indicated by —▸ and degree of dip thus —▸ 85° the —▸ always pointing in the direction of the dip.

The diamond drill holes are plotted on these geological sheets and their geology plotted on them. By help of these, many difficult problems of structure are often simplified. When a diamond drill core assays above a certain value the amount of Au, etc., is stated in small figures at that point. The geology of the diamond drill holes is plotted in similar coloured inks to the veins, dykes, etc. The plotting is done by drawing a parallel line close to line of hole and the geology is plotted between these lines. Each change is separated by a black line. When the core is greatly broken the space is dotted. Geological map of first level is shown in Form XIII. and Form XIV. gives method of plotting D. D. Holes.

The stations are marked on this map as is also the collar of shaft.

Assay Sheets.—Every assay is plotted on tracings. These tracings are enlarged three or four times by a pantograph from the working map. Their value in gold, etc., is given and width of sample taken in feet. Thus $\frac{5.5}{\$50.00}$ represents $50 in gold in a sample 5.5 feet wide. The smelter's gross assay value is used. This is gross assay value less indirect charges. (Form XV.) gives method of plotting.

Office Details.—Tracings are kept of all maps both for blue printing and for use outside of office, as originals never leave



the Survey Department. A very complete system of indexing is employed (See Form XVI.) so that any information can be obtained at a moment's notice. All notes taken in connection with the mine are indexed for reference. The note books are all numbered and pigeon-holed in the vault; maps are also kept in the vault on shelves with their tracings. A record is kept of the persons who make each survey. The working map is taken from the vault in the morning and is spread out on its table where it is left for reference all day. These maps are never seen by any but the general manager, the superintendent and the surveying staff. The system is very complete in all its details.

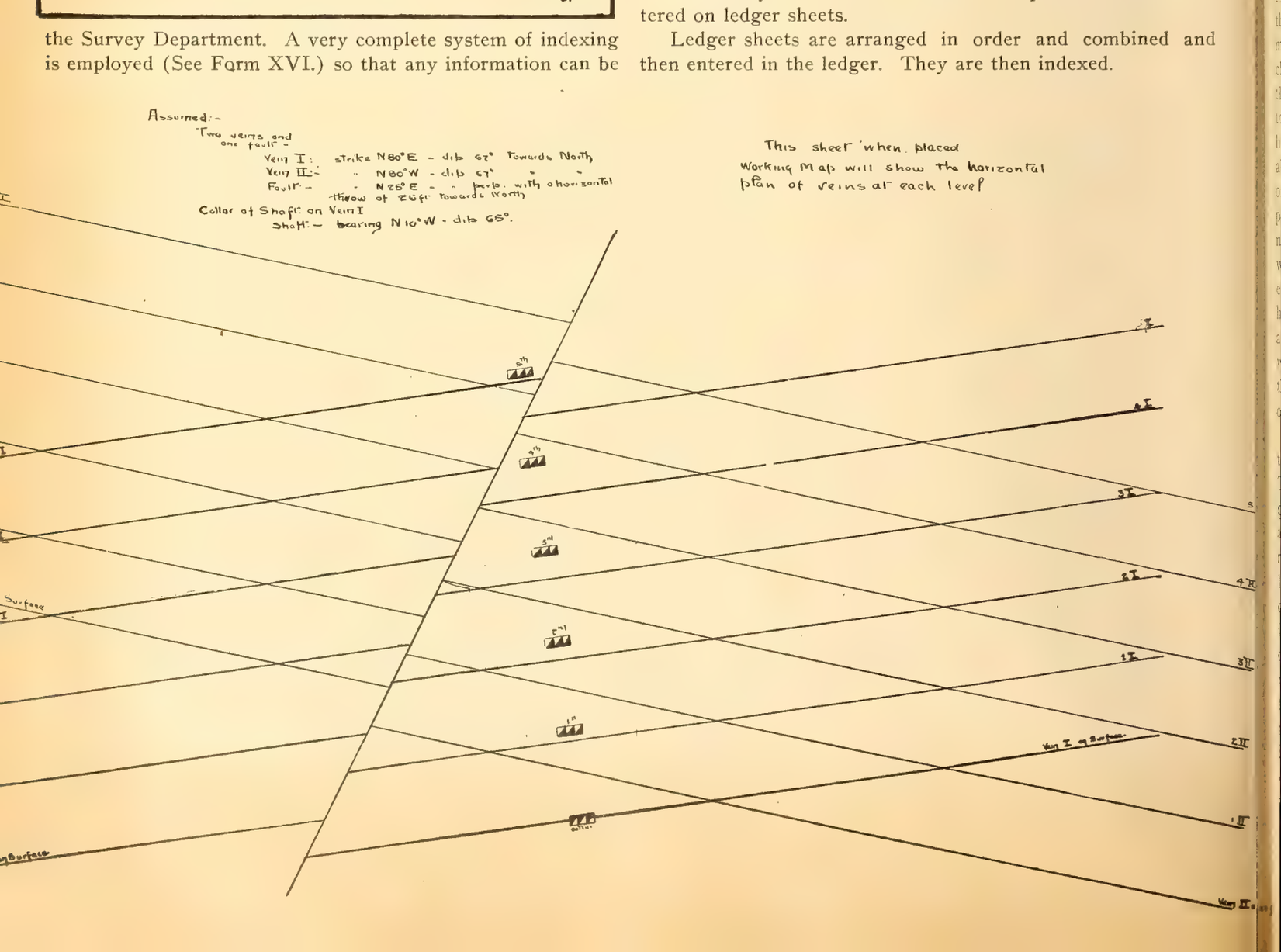
LEDGER INDEX.						REMARKS
⊙ No.	Place	Ledger		Note Book		
		No.	Page.	No.	Page.	
1	10z Tunnel	1	21.-82-84	3	1-63-67 85 97-101	
2	10z drift	1	27-40.-82	3	1-70	
3	10z drift		etc.			

Sample of one method of Indexing employed

FORM XVI
Indexing.

Order of Taking and Using Notes.—Notes taken are first entered in field book. Then computation is made in the office in an ordinary blank book and results are plotted and then entered on ledger sheets.

Ledger sheets are arranged in order and combined and then entered in the ledger. They are then indexed.


Assumed:-
Two veins and one fault -
Vein I:- strike N80°E - dip 62° towards North
Vein II:- " N80°W - dip 62° " "
Fault:- " N26°E - " perp. with a horizontal throw of 25ft towards North
Collar of Shaft on Vein I
Shaft:- bearing N10°W - dip 65°.
This sheet when placed Working Map will show the horizontal plan of veins at each level
Surface
Vein I on Surface
Vein II on Surface

MINING IN THE YUKON.

By F. T. Congdon.

The following is an excerpt from an interesting address recently delivered by Mr. Fred. T. Congdon:

Gold mining and the Yukon are inseparably connected and it is difficult to attract attention to the other great mineral resources of that country or to persuade men that the gold resources are not about exhausted. I should accomplish something for the Yukon if I were able to convince sensible men that its wealth of gold has only been scratched and that the future will see greater fortunes produced from that country than have been and that the coal fields, but more particularly the copper deposits of the Yukon are worthy of the attention of capitalists.

The mistaken idea generally prevails that the Yukon was practically discovered in 1896 and that mining was unknown there until that year. I think I am correct in saying that there was mining more than twenty years ago upon the shores of the Stewart River, a tributary entering the Yukon River, on its right limit, about seventy miles up stream from Dawson. There was also a mining camp at Forty Mile on the Yukon River near the western boundary of the Yukon, the 141st parallel of longitude, many years ago. When the discovery was made on the creeks near Dawson the miners from Forty Mile were among the first to stampede to the new district.

It will be interesting to sketch the evolution in mining methods in the Yukon since 1896. First, however, a word as to the formation of the country. There can be no doubt that the present level of the rivers is very much lower than formerly. On the hills in the vicinity of Dawson is found the clearest evidences. It was expected by the early miners in the country that gold would only be found in the creek bottoms. Later the discovery, on the benches and still later higher up on the hills, of gold, surprised the best miners probably more than it did the inexperienced. The wash gravel on the benches and hills displays as clearly as possible in many places the former levels of the river system. The White Channel, as it is called, appears at a level high above the present water, as well as beneath it, and exhibits most unmistakable evidence of the action of a large body of water flowing much higher than at present. On the surface of the land was found at first forests of spruce, bushes, moss, weeds and grasses. The woods and the moss in particular, prevented the land from thawing to any depth even in warm weather. At the roots of the moss would be found ice in mid-summer.

If Agricola (Mr. George Young) was correct, the same was true in many parts of Nova Scotia seventy or more years ago. The removal of wood, moss and the other covering of the ground has wrought a change in many places in the Yukon, and wherever the land is cleared the permanent frost line retreats many feet farther down from the surface than formerly. Most of the ground is frozen to an unknown depth except near the surface in warm weather. This is an advantage in mining chiefly in respect to the safety of the ground without much timbering. The top of the ground is usually muck, often very rich. This varies in depth from a few inches up to twenty feet or even more. It is a disadvantage to almost any form of mining, but more particularly in hydraulic mining. Beneath the muck in mining ground is usually found a depth of wash gravel of all degrees of fineness. In extent this varies from a few feet up to eighty feet or more in depth. Sometimes the pay is scattered throughout a considerable depth of this gravel, but generally it is not found more than from three to five feet above bed rock.

In former days the usual manner of mining was to sink a shaft until bed-rock was struck. From the bottom of the shaft tunnels were driven following the pay ore on bed rock. The ground was thawed by burning cordwood in the mine and removing the thawed ground as long as it contained pay. It needs no imagination to appreciate how unpleasant and unhealthy was this mode of mining. The tunnels having been run to the limit of pay or of the claim, chambers were worked from the tunnels and the endeavor was first only to move pay dirt, and second to begin removing it as far from the shaft as possible, so that as the ground caved in it would not hinder carrying out to the shaft the remaining pay dirt. In those days the Dawson District was chiefly a winter camp. As the winter's frost helped to keep the ground up without timbering and stopped the flow of water it was cheaper mining in winter than in summer. The pay dirt was brought to the shaft and hoisted and placed in a dump near the shaft's mouth.

The first marked improvement was in the mode of thawing the ground. What are known as steam points were introduced; at intervals of, say, four or five feet, holes were drilled to a depth of two or three feet on the side wall or face of the drift in the pay dirt. Long iron tubes, steam points, were inserted in these holes and steam was forced into the ground through rubber tubes connected with the steam points at one end, and the engine at the other. The points were left in for four or five hours and then taken out and the thawed ground removed. While the ground was being removed the points were, of course, available for thawing ground on another face. The chief extra expense of winter work was occasioned by the necessity of handling the dump a second time in the spring when the water was running.

In summer mining, the pay dirt hoisted from the shaft can be dumped at once into the sluice boxes and the gold recovered. In winter work the dump required to be thawed and was shovelled into the sluice boxes after being loosened by the pick. This mode has been cheapened lately by placing the sluice box so that the dump is piled around and above it and using water to wash the dump into the sluice box. The richest pay is almost invariably near the bed rock, and the bed rock, which is generally soft, is removed to a depth of six inches or thereabouts, and frequently contains more gold even than the gravel.

For a time it was thought that the frozen ground rendered working by hydraulic methods difficult, if not impossible. Experience has proved that what was deemed a disadvantage is quite the contrary, All that is necessary is to make an open cut from the surface to bed rock, and as the exposed ground thaws, turn on the water. As the opening thus increases, the area of thawing ground constantly increases. The process of thawing disintegrates and makes the ground easier to move when the water is turned on than in dry ground. The water from the ice in the thawed ground helps the water supply.

When it is remembered that the ordinary wages in the Yukon are five dollars a day and board, it will be appreciated what a saving can be effected by water. By ordinary placer methods it is impossible in the Yukon to work ground yielding less than two dollars to the cubic yard of pay dirt.

In California, ground, I believe, is hydraulicked, which yields five cents to the cubic yard. The same methods will certainly work successfully twenty-five cent ground in the Yukon, and there are vast tracts of ground in the country that will average over fifty cents to the cubic yard. The hills back of Dawson which cover a large area average much higher than fifty cents per cubic yard. The greater part of

Bonanza, Eldorado, Hunker, Dominion, Gold Run, Sulphur, Quartz, and All Gold, for a distance on each of not less than ten miles and for an average distance of fifteen miles, with their benches, hills, tributaries, and gulches of vast extent, would yield most magnificent profits, if worked by the hay-draulic method,

Even in the portions which have been worked by ordinary placer methods, if they were re-worked, by hydraulic method, splendid returns would result. There are more fortunes to be made by companies acquiring good extents of auriferous ground and bringing on water, than have been made by individuals in the past, and fortunes of much greater volume. The gold output of the Yukon fell to $10,000,000 last year. It will probably still further decline for a year or two, but as soon as capitalists make the large necessary investments and supply water, the output will jump up even beyond the old figures of twenty and twenty-five millions. I have not enumerated one-half the known auriferous creeks of the Territory. Hydraulic propositions of splendid character are so numerous as to make choice difficult. The only trouble is getting water and here is where capital is required, and where capital will undoubtedly reap rich returns. Ground that will not pay wages when worked as at present will produce rich returns for its owners when worked by hydraulic method.

In some instances pumping plants have been installed to provide water.

At Cheechako Hill, by means of an engine of about 300 horse power, water is pumped to a height of 300 feet and still has force enough when it reaches that elevation to tear out the ground. Others have similar plants. The first mentioned probably cost when installed, $350,000; others cost nearly as much. But in addition to the larger original cost, the difficulty is the cost of operation. To run such an engine as the one at Cheechako Hill, takes fifteen or twenty cords of wood per day and wood costs $15 or more per cord. And $450 or $500 per day will not more than cover operating expenses. On the other hand, water provided for hydraulic work by gravity may involve much capital for original work, but current expenses are small.

Last summer a ditch to bring water to a reservoir on the Hill in the rear of Dawson was built. Running to the left and round the hill was a water sluice, which continued for a distance of eight or nine miles and to the right about three-fifths of a mile to a large natural reservoir which required only slight work to make it capable of holding many millions of gallons of water. This ditch crosses what is called "The Slide." The ditch and the reservoir are 600 feet above Dawson. The hill back of the slide, and to the right rises to the Dome, a height of about 2,000 feet above Dawson.

Now, the construction of the ditch and reservoir cost probably not over $40,000. The ditch has a capacity of 2,500 miners' inches. With its elevation it can furnish ten better streams than the one furnished by the plant at Cheechako Hill, and each stream can be handled at about one-thirtieth the cost of that.

Bonanza Creek is about a third or half a mile wide at its entrance. It extends for a distance of over twenty miles, and probably averages one-third of a mile or perhaps a little more in width.

In the gravel the pay is found throughout from a few feet below the muck to bed rock. Where the men work is about 350 or 400 feet above the Klondike, and the reservoir mentioned above is about 200 or 250 feet still higher and in a straight line from the Klondike. The Dawson is about half a mile to the left. The reservoir is just to the right. All the ground to the height of land on the left and higher on the right for a distance of about a mile, will pay handsomely for hydraulicking. Afer this is finished, which will take years, the water from the reservoir can be syphoned across the Klondike and used to work the hill to the left or the Bonanza. There is in that vicinity one of the greatest deposits of pay gravel to be found in the world. Formerly the channel apparently crossed from the level of that hill to where the men are working and at about the level they are or a little higher. On the side of the Klondike opposite Dawson are benches which also carry pay, not rich enough for ordinary placer mining, but most profitable for hydraulicking. These can also be worked by syphoning water from this reservoir.

But this ditch is only a beginning. A contract is about to be let for a ditch to bring water from Twelve Mile River, a contributary of the Yukon River about eighteen miles north of Dawson and called Twelve Mile River, because, lucus a non lucendo, it is not twelve miles from any place, that anyone knows of. This ditch, with the flumes, and pipes which must be used in places, will be over forty miles in length. It will bring the water to a reservoir about 600 feet above the reservoir of which I have been writing above and therefore 1,200 feet above Dawson. Its capacity will be 10,000 miners' inches. To construct this ditch with the reservoir named, and several others in its course, and syphon the water across Bonanza and carry it up that creek for eleven miles will cost, it is estimated, about $2,500,000. It will be carried up Bonanza to the mouth of Eldorado and will there have an elevation of over 500 feet. The whole of Bonanza with Gold Hill and the other rich hills can be worked with this water and it can easily be later carried up Eldorado for miles and afford water for working that creek.

Water is now supplied to small operators at the price of nine dollars per sluice-head per hour, and even a higher price is often paid. There are 40 inches in a sluice head. Nine dollars, therefore, equals 22½ cents per inch per hour. If the company had 10,000 inches to deliver at the mouth of Eldorado as described it could easily dispose of it at five cents per inch, which for a day averaging say 20 hours would mean one dollar per day for every inch of the 10,000 The season for hydraulic working is of about 125 days' duration. The possible income of the company from the sale of water may be easily estimated from these figures, although, of course, some deduction must be made for accidents and emergencies.

But in addition to the first sale, the company can easily recover a first and even a second time a large portion of the water sold and resell it. The later sales will, of course, be at a lower figure, because of the lesser pressure, but it is considered that a second sale of 10,000 inches of water recovered can easily be made at say 2½ cents per inch.

When all possible allowance is made, it will easily be seen that the company is likely to receive back its capital investment in very brief time. Not only will this work be most profitable to the company that constructs it, but it will be of the greatest possible profit to mine owners, who will be enabled to get water, and can, after paying the price named, work their grounds at only a fraction of the present cost.

Of course 10,000 inches does not supply all the water needed. There is ample work and good returns awaiting half a dozen companies each supplying that quantity of water.

The dredge is a feature in the Klondike, and I had intended to give some descriptions of its operations and of the great area of ground in the Yukon fit for dredging. There are

hundreds of acres in the basin of the Klondike, near Dawson, that are now known to be profitable ground for dredging.

There is as yet practically no quartz mining. On the Violet Hill group of quartz claims, on the left limit of Eldorado, and about three miles from that creek, a lead has been prospected to the depth of a couple of hundred feet, with tunnels as long, and all in solid ore. Whether the property will pay for milling will shortly be demonstrated. Many other leads are known to exist and are now also being proved. Considering the wide distribution of quartz in places, the excellent quality of the ore, and the fine showing from small development work, I have very great confidence in the ultimate establishment of a great quartz mining industry. The best ore has been found at a considerable distance from Dawson, and in a region in which quick development can only result from large expenditure. Once the profitable value of a deposit is established, cost of freight will quickly be reduced by construction of good Government roads; but, in the interval, the high cost of freight, etc., makes large sums go a very short way in development.

It is too early to speak more than the language of hope with regard to this branch of mining, but I shall be greatly surprised if the disclosures of a brief time do not astonish the world. It is to be hoped that if the results justify these expectations, that Canadian manufacturers will be able to meet the demand for machinery and other supplies that is certain to ensue.

Many seams of coal have been located, and several quite extensively worked in the Territory. The works of the Dawson Electric Light and Power Company, which not only furnishes light and power in Dawson but also on the creeks to a distance of many miles from Dawson, are operated by steam generated by coal. The coal is brought from Coal Creek, a tributary of the Yukon River, 30 or 40 miles below Dawson. Twelve miles of railway have been constructed from the coal mine to the Yukon, and several hundred thousand dollars expended upon the whole undertaking. About three hundred miles above Dawson is another coal mine, which has the great advantage of having its pit head just by the river. The coal from this can be mined and shipped very cheaply, and the seam is probably the best coal yet developed in the Territory. The different coals vary from lignite to anthracite, a seam of the latter having been located near White Horse.

The mention of White Horse brings me, in conclusion, to the splendid copper deposits that are being developed there. The copper belt extends in a crescent shape for a distance of sixteen or more miles around White Horse, at a distance in the nearest place of about three miles from the town. On this belt development work has been done in many places, costing in the aggregate not less than $100,000.

The greatest amount of work has been done on the Copper King. A shaft has been sunk for 200 feet, and tunnels driven for 400 feet. The ore is of splendid grade, averaging over 23 per cent. copper, with gold and silver values. It almost furnishes its own fluxes, and is highly thought of by the smelters to which it has been shipped to the amount of many hundred tons. A smelter will doubtless soon be erected at White Horse, as the near vicinity of the copper ore, of fluxes and coking coal furnishes all the requisites for a great industry. When it is remembered that less than nine years have passed since the rush to the Yukon in 1896, and that in the interval the rich placer deposits have naturally occupied the greater part of the attention of every one within and without the country, it will be seen that quartz, copper and coal mining have made fair progress.

THE LATE DR. A. R. C. SELWYN, C.M.G.—HIS WORK IN CANADA.

By H. M. Ami, M.A., D.Sc., F.G.S.

It was on the first day of December, 1869, that Selwyn took charge of the Geological Survey of Canada, which had from its inception, in 1841, been carried on by Sir W. E. Logan. Selwyn had arrived in Canada in October of the same year, and vigorously set himself to the task of studying and revising the reports which had been received from the various assistants, who included the following well-known geologists:—Sir Wm. E. Logan, Edward Hartley, T. Sterry Hunt, Robert Bell, James Richardson, Charles Robb, and H. G. Vennor. Besides the above, Robert Barlow and his son, Scott Barlow, had charge of the topographical and cartographical part of the Survey, whilst Elkanah Billings was the palaeontologist, with Messrs. Horace Smith and Thomas C. Weston as assistants, one as an artist, and the other in charge of the museum work, skilled lapidary, préparateur, etc.

When Selwyn became Director of the Geological Survey of Canada, and deputy head of the same, the confederation of some of the British Provinces had only just been effected, and accordingly there was now open to him a much wider field of investigation than to his predecessor. As one after another the different provinces became part and parcel of the Dominion of Canada, the work increased correspondingly, and to such an extent was this the case that the staff of geologists and assistants had to be materially increased, and at the same time men had to be trained to pursue the good work of the old *regime*. It can be safely said that the staff of the Geological Survey of Canada has never been, and even now, is altogether inadequate to cope with the immense field open in the mineral resources of Canada as the Dominion is constituted to-day.

This period was one of great activity in the Canadian Survey. The first copies of Logan's large "Map of the Geology of Canada and adjacent parts of the United States," prepared for the engraver by Robert Barlow, were received during the first month of Selwyn's administration, from Edward Stanford, the publisher, Charing Cross, London.

As an instance of the great activity and energy displayed by the second director of the Geological Survey of Canada at the outset of his career in Canada, it may be remarked that he not only proposed to Hon. Joseph Howe, as Minister or Head of the Department under which the Geological Survey of Canada was placed, various points bearing on the usefulness of a geological survey from a practical standpoint, but also presented the annual "Summary" report of the geological investigations made by the staff during the previous year.

He further impressed upon the Government the advisability of placing a special appropriation in the estimates of the year for the distribution of Logan's large map just received, submitting at the same time a list of public institutions, libraries, etc., where the said map would do a great deal of good to Canada.

In 1870 he investigated the gold fields of Nova Scotia, and prepared an important report giving the result of his work there. (See "Report of Progress, Geol. Surv. Canada, 1870-71," pp. 352-82, Ottawa, 1870).

In the following year, under special instructions from Hon. Joseph Howe, he undertook an exploration in the remote province of British Columbia, "on and in proximity to the several lines which will be explained by the engineering parties (of which Mr. Fleming, now Sir Sandford Fleming,

was engineer-in-chief), and on one or the other of which the future Pacific Railroad will be located." In the "Report of Progress," 1871-72, is given an account of the results achieved during these explorations. The route selected by Selwyn took him from Hope on the Fraser via Fort Colville, the Kootenay River and the Columbia to the Howse Pass, and afforded facilities for returning later by waggon road, 378 miles, from Cariboo to Yale. Not only the coal fields, gold fields and other occurrences of economic value, but timber, soil, water power, agricultural and numerous other features of special value and interest were recorded, together with systematic descriptions of the various geological formations met and their relation to one another in the stratigraphical series, from the oldest up.

Then, in 1872, we find him journeying from Lake Superior to Fort Garry (now Winnipeg) and in the "Report of Progress," 1872-73, we find no less than three special reports on the silver mining localities of Thunder Bay, on the geological investigations from Lake Superior to Fort Garry and on the Acadia iron ore deposits. In the following "Report of Progress," he gives the result of his investigations on the geological exploration in the Northwest Territories from Fort Garry to Rocky Mountain House. (Loc. cit., pp. 17-62.)

In the following year Dr. Selwyn remained for the most part of the year in the office, attending to the numerous and onerous duties incumbent upon him as director, and preparing for the extra work imposed upon him in connection with the Canadian exhibit at the Centennial Exhibition held in Philadelphia. In the "Report of Progress," 1875-76, pp. 28-31, he gives the summary of his own explorations in British Columbia, and on pp. 31-69 presents his "Journal of the Expedition through the Peace River Pass." On pp. 292-293 he adds an important note on a boring made in 1875 on the Swan River, in the territory now within the Province of Manitoba. He also prepared a map of the region from Quesnel, British Columbia, to the junction of the Peace and Smoky Rivers. In 1876-77 ("Report of Progress" for those years), "Notes on the Quebec Group" appear, a subject to which he gave considerable attention, and in which he did much to differentiate from that series those rock formations of volcanic origin. In the report of 1877-78, pp. 1-5, further notes are given "On the Stratigraphy of the Quebec Group" (of Logan) and older crystalline rocks of Canada. This is said to be one of the best attempts ever made at a systematic classification of the most ancient and difficult rock masses. The following year's report (1878-79), Selwyn's work in the Eastern Townships and other portions of Quebec is given, and a "Note on the origin of granite treated as metamorphosed strata, not intrusions" occurs in the "Report of Progress" for 1879-80, pp. 5-6. The same report contains also an account of boring operations in the Souris Valley in Assiniboia (pp. 1-11). On pp. 51-55a, the fossil plants collected by Dr. A. C. R. Selwyn at Roche Percée and determined by Sir J. W. Dawson are recorded and described. His work on Lake Superior Region during 1882 is embodied in the report for 1880-82, pp. 16-17, together with a report on an exploration in Manitoba during the same year on the White Mud and Souris Rivers.

"On the geological nomenclature and colouring and notation of maps" forms the topic of an important contribution from his pen, pp. 47-51, of the "Report of Progress" for 1888, followed by additional notes on the geology of the south-eastern portion of Quebec, pp. 1-7a, and followed later in the report by a note on the accuracy of the plan of the mouth of the Moose River surveyed by R. Bell in 1883-84, besides a summary of the work of Selwyn during 1883 on Lake Superior, on the Souris coal district in Assiniboia and in the Cascade coal basin of British Columbia.

Selwyn leaves behind him a career full of usefulness to the Empire. His work was truly of an Imperial nature, for it extended not only into various portions of Great Britain, but also of the distant colonies of the Mother Country, to the Island Continent of Australia and to the Dominion of Canada.

There is little doubt that the state of efficiency of the Canadian Survey grew apace with Selwyn. Having had for many years closely associated with him as chief adviser and assistant the late and lamented Dr. George M. Dawson, Selwyn led the ship through thick and thin successfully. It cannot be denied that it was under Dr. Selwyn that the Survey reached the height of its career and efficiency in carrying out the objects and aims for which it was instituted.

Selwyn's aim from the first was to make the Geological Survey of Canada an eminently practical department in which the records of mines and mineral statistics would be kept for the use and information of parliament and the public.

A "MISCARRIAGE OF JUSTICE"—THE ROBERTS ASSAULT CASE.

To the Editor:

Sir:—What would appear to be a grave miscarriage of justice, and one that will have very serious and far-reaching effects on the mining industry of this province, occurred at the May sitting of the Supreme Court of British Columbia, in Nelson.

The circumstances were as follows: Mr. M. S. Davys, who is one of the oldest and best known mining engineers and mine managers in the Kootenays, was operating some mines in the Slocan, near the town of Silverton, on Slocan Lake. Finding it impossible to satisfactorily run the boarding houses with white cooks, Mr. Davys decided to employ Chinese cooks. This was resented by the Miners' Union at Silverton; Mr. Davys was threatened, and, finally, a shot was fired and the bullet passed very close to Mr. Davys' head. John Roberts, the president of the Silverton branch of the Miners' Union, was arrested and tried for attempted murder. The evidence seemed to be unusually clear and direct, but the judge summed up strongly in the prisoner's favour, and he was acquitted.

In order to clearly understand the circumstances, it is necessary to trace the history of the Silverton branch of the Miners' Union. During the labour troubles in the Slocan, in 1899, the Silverton branch of the Miners' Union passed certain resolutions. The printed account of these resolutions contains, among others, the following:—

"Resolved,—That we do not consider ourselves any better than the miners of the Coeur d'Alenes. Outrages and arrogant wrongs have ever provoked and should provoke violence. The history of no country needs to be closely searched to find records of violent resistance to tyrants. . . . The Coeur d'Aleners blew up the Bunker Hill mill. Let tyrants take warning."

These resolutions were rescinded and expunged from the minutes after the arrest of Roberts, and before his trial.

The evidence at the trial was as follows:—

(a) Mr. Davys testified that Roberts had threatened him.
(b) A witness testified to having seen the prisoner fire the shot and then move away in the direction of his cabin with the gun in his hand.

(c) A witness testified to having seen the prisoner directly after the shot was fired leaving the spot described by the previous witness, and going in the direction of the prisoner's cabin, with a gun in his hands.

(d) A constable and a special constable testified to having found footprints in the snow at the point described by the previous witnesses. They followed these tracks to the door of prisoner's cabin; that they entered and secured prisoner's rubbers; that these rubbers exactly corresponded with the tracks. Also that on a shelf at the head of prisoner's bed they found three cartridges for a 44.40 rifle, having a metal patch, and being similar to the bullet fired.

(e) A witness testified to the prisoner owning a 44.40 rifle, and using cartridges with a metal patch.

The witnesses for the defence did not disprove any of these statements, but testified to the general good conduct of the prisoner. The prisoner, in his evidence, denied the statements of each witness for the Crown; accused the constables of having manufactured evidence against him; testified to having seen the constable place an empty cartridge behind a stump near his (prisoner's) cabin; denied having ever possessed bullets of the kind produced, namely, with a metal patch.

The evidence of the prisoner's guilt would seem to a man of ordinary intelligence to be complete and conclusive. The judge refused to allow the prosecuting attorney to call evidence in rebuttal, and after summing up in the prisoner's favour, said (as reported in the Nelson *Tribune*, of May 13th): "If it was inconceivable to think that Constable Black concocted evidence, wasn't it monstrous to think that Roberts should fire into a roomful of men?" Apparently the prisoner was acquitted because the crime, if committed, would have been "monstrous," but the constables are to be deemed guilty of having "concocted evidence," and the other witnesses of having committed deliberate perjury, simply on the evidence of the prisoner.

The Provincial Police of British Columbia are an exceedingly fine body of men, and it is largely due to them that this province has been so free from crimes of violence; and it seems extraordinary that a judge should so lightly brand them with "concocting evidence," when to the ordinary man they seem to have done their duty in a most creditable manner. This will hardly encourage them to use their best efforts to bring criminals to justice.

One of the most favorable features of the mining industry in British Columbia, and one that has been recognized and appreciated by both capitalists and miners of the United States, as well as by Canadians and Englishmen, has been the security of life and property, and the immunity from crimes of violence. It has been recognized that the law was enforced without fear or favour, and that punishment quickly and surely followed crime. Such a decision as this in the Roberts case will go far to destroy this confidence and to encourage the lawless element which is always to be found in new and sparsely settled districts.

A mining engineer is bound to take into consideration all matters which may affect the interests of those who employ him, and who invest their capital on his recommendation, and in future he will not be able to include among the favourable conditions in this province the security of life and property and the certain punishment of crimes of violence.

I am, Sir, your obedient servant,

LESLIE HILL.

Nelson, B.C.

THE ELMORE PROCESS IN ROSSLAND.

To the Editor:

Sir:—I beg to enclose a cutting from the Sandon *Mining Standard*, of May 20th, concerning the Elmore Process, and its application to the Slocan dry ores, a copy of a letter from Mr. Elmore, dated June 7th, in reply to this article, addressed to the Editor of the Sandon paper, and a copy of a letter received from Messrs. Alexander Hill and Stewart, dated May 18th, retracting certain statements which appeared in their annual report, and which caused a lot of comment by the press.

In your issue of January last, in an article on the Rossland Power Company's new plant, there was reference made to "the now discredited Elmore Process," but I hope that after having looked into these enclosed particulars, that you will see that the temporary failure for us to make money in this camp has not been the fault of the process, but on account of the absurdly low grade material we have had so far had to work on.

Our plant at the Massey Mines, Ontario, is doing very well, and I think that in the course of the next year there will be quite a lot of copper mines in Eastern Canada having enough value to treat by the Elmore Process although not rich enough to smelt direct, and not suitable for any other treatment, that will adopt our process.

I am, yours very truly,

H. H. CLAUDET.

EXTRACT FROM CUTTING.

"The Elmore oil process has had a more or less checkered career in British Columbia. So much was promised and so little apparently fulfilled, that although its people persistently claim it did not receive a fair show, still on account of the poor success attained the process has been condemned.

"It appears that the process is well enough, but that its application to such low grade ores as the Rossland camp affords, has given it a 'bad black eye.'

"The company is therefore recommended to make a thorough examination and test of the dry ore districts along the North Fork of Carpenter Creek, the Bear Lake district and along Slocan Lake.

"In all our experiments with the oil treatment, on slightly different lines to the Elmore method, it is found that the selective action of oil is strongly marked in these ores. In the Bear Lake district the minerals are grey copper, brittle and native silver, black sulphurets and antimonial silver. In the grey copper, instead of sulphur, we find selenium; in this case the ore being a selinide of silver and copper. The minerals are sometimes disseminated through the quartz gangue, the quartz being very hard, the mineral soft and friable, and it is doubtful if any system of water concentration would give extraction values enough to warrant putting up a plant.

"Here is where the Elmore Process would do great work. By locating the plant at a central point near the mines, so that several of them can easily and handily reach it, with a minimum of transportation expense, it would be possible to cut out nearly all the waste matter, thus saving the large amount

of charges now incurred in shipping the ore to the smelter. When it is known that probably less than 5 per cent. of the ore now shipped is the valuable bulk, and that this 5 per cent. has to stand charges in packing and freight and treatment of the 95 per cent. waste, it will readily be seen that a process which can cut out this expense will be a large factor in making these districts rich mining camps.

"On the North Fork of Carpenter Creek the ores are similar in character to the Bear Lake ores. There are good places for mill sites with water power, and it would be necessary to install small plants on each side of the divide to accommodate the mines and prospects.

"The ores of the Slocan Lake district are not as well suited to the process to deal direct with oil, as they contain more or less percentages of lead and zinc blende. Water concentration, with the oil process as an auxiliary treatment, would, we believe, solve the troublesome problem of concentration.

"It is quite safe to say, that if the Elmore people had spent one-tenth of the money in this field that was spent in the Rossland camp, they would have had a good business, and the process would have received a boom. Our dry ore districts would have be benefited and would now be turning out a large output of silver and other metals."

LETTER FROM MR. ELMORE.

In the beginning of your article you say: "So much was promised and so little apparently fulfilled" in regard to the Elmore Process at the Rossland camp.

May I point out to you that, as a matter of fact, more has been accomplished in the actual working of the Elmore Process Plants in the Rossland camp than was ever claimed for them.

In the case of the Le Roi No. 2, for instance, they sent to this country a bulky parcel of their ore for the purpose of being tested. The value of that ore was about $8.25 per ton for gold, silver and copper. The trials were carried out under the immediate supervision of a consulting engineer appointed by the Le Roi No. 2 Co. The results were considered eminently satisfactory, and it was decided that a small plant should be erected on the mine, with a view to ascertaining if under local conditions as good results could be obtained as had been secured in our testing works in London.

It was pointed out by us and by the engineers of the Le Roi No. 2 Co., that no profit was to be expected from the operation of so small a plant, under the particularly unfavorable conditions of expensive labour, expensive power, and high cost of oil in Rossland.

The Le Roi No. 2 Co. quite recognized this obvious fact, and we contemplated the erection of a very much larger mill if the technical results achieved by the small plant warranted it.

The two unit—50 tons per day—plant was in due course erected, but instead of the ore on the dumps averaging $8.25 per ton, as the sample sent to London indicated, the values were found on milling considerable quantities to be in the neighborhood of $2 or $3, and notwithstanding every effort on the part of the Le Roi No. 2 Co. to even mine ore of a milling grade, as a matter of fact they never succeeded for any considerable length of time in supplying the mill with ore of much more than $4.50 per ton; but perhaps the most serious difficulty was the evident utter impossibility of supplying ore in sufficient quantity to even keep this small mill continuously in operation.

It is manifest that if one's labour bill and establishment charges are going on continuously when a plant is only working for about half its normal working time, that costs per ton must necessarily be high. This is precisely what took place at the Le Roi No. 2. I think it is safe to say without actually referring to the figures, that the mill never ran more than about half its rated time, because the management were incapable of supplying the necessary quantity of ore to run it night and day full time.

We feel that the unfortunate over-valuation of the quantity and quality of the ore on the dumps by the Le Roi No. 2 people has done us an infinite amount of harm, but when in the actual report of the Le Roi No. 2 Company there appeared figures which we knew to be absolutely incorrect, we naturally took strong exception to them.

All the monthly reports which were received from the mine, which were agreed between our representative, Mr. Claudet, and the then management of the Le Roi No. 2, showed that the final tailings from the oil plant had a value of about $1.25 for gold, silver and copper.

This undoubtedly proved excellent work on the part of our plant, but later on the Le Roi No. 2's Annual Report stated that the final tailings from the oil plant assayed $2.10 per ton, and we naturally sought an explanation of this discrepancy.

Mr. Couldrey, the late manager, happened to be in London recently, and I had an interview with Messrs. Alexander Hill and Stewart, consulting engineers to the Le Roi No. 2 Company, and with Mr. Couldrey.

The explanation of the discrepancy between these figures is that whilst the agreed monthly reports gave the actual assay of samples properly taken with automatic samplers, the figures quoted in the Annual Report were the result of mere calculation.

Mr. Couldrey admitted this, and Messrs. Alex. Hill and Stewart, recognizing the injury that had resulted to us, were good enough to write a very frank letter of explanation, a copy of which I enclose herewith.

I think you will accept this letter of Messrs. Alex. Hill and Stewart's as being an authoritative statement as to the real cause of the shutting down of the Le Roi No. 2 plant. It disposes once and for all of any suggestion of a failure of the Elmore Process on that mine, and we are naturally desirous that the real facts in the matter should be known.

If the Le Roi No. 2 Company had supplied the mill with the ore of the same grade as they sent us to make our trials upon, a handsome profit would have resulted, even when working the small plant, and under the particularly disadvantageous conditions prevailing in Rossland.

In regard to the oil plant erected on the White Bear mine, at Rossland, here again the plant gave every possible satisfaction in working, the grades of concentrates produced was excellent, the extraction of values secured was all that could be desired, and the one and only difficulty which existed was the failure of the ore supply. As a matter of fact, the value of the ore sent to the concentrator at the White Bear did not exceed the cost of mining it, to say nothing of the cost of crushing, concentration, smelting of concentrates, etc.

We naturally feel it a gross injustice to us to condemn our process or plant because of the failure of the mines to produce ore with any reasonable value in it. We have never claimed to create values. All that we have claimed is that we have an excellent economical process for recovering the values where they exist.

You will doubtless be interested to hear that our plant erected on the Massey mine, in Ontario, is doing most excellent work. We have several other plants under construc-

tion, some of them about to start, in different parts of the world.

In regard to your suggestion as to the treatment of the dry ores of the Slocan district, doubtless Mr. Claudet, our representative in Rossland, will be happy to tell you what he has so far accomplished in this connection, and I am writing him on this matter by same mail.

Perhaps you saw the letter on page 958 of the *Engineering & Mining Journal*, of New York, for May 18th, 1905, in which are stated results obtained by the Elmore Process on a silver-bearing galena with a heavy baryta gangue.

I beg to remain, yours faithfully,

For the Ore Concentration Syndicate, Ltd.,

(Signed) A. STANLEY ELMORE.

LETTER FROM MESSRS. ALEXANDER HILL AND STEWART.

We much regret to learn from Mr. Stanley Elmore that wrong conclusions appear to have been drawn from the figures published in our report regarding the working of the Oil Concentration Process at the Le Roi No. 2 Mine.

This being so, it is only right we should say at once that our report was not intended in the least to condemn the Elmore Process.

The operation of the oil concentration plant at the Le Roi No. 2 was suspended chiefly because the grade and the quantity of the ore on the dumps had been over-estimated, and, as it was found on further development of the mine that it was entirely a "shipping proposition," it became impossible to find even enough concentrating ore to keep the small trial mill at work at full capacity.

Owing to the particularly unfavourable conditions prevailing in Rossland when your mill was started, it was essential to commercial success that the Elmore Process should be worked on a large scale, which the Le Roi No. 2 Company were unable to do for reasons above stated.

The difference in the figures of tailings values quoted in the earlier and later reports, to which attention has been drawn, is easily accounted for, because those in the earlier reports were the result of actual agreed assays, when the automatic samplers were working, whereas those in the later reports were calculated figures only. The method of arriving at tailings values by calculation had to be resorted to in this case because of the subsequent failure of the automatic samplers during cold weather.

The agreed results of actual assays during January and February, 1904, viz., $1.30 per ton (total gold, silver and copper) as the value of the tailings for these months can therefore be safely quoted as correct.

We need hardly add that we still have a high opinion of your interesting process, and we trust to hear that the greatly improved conditions in Rossland have enabled you to find a large extension of its application in that camp.

Yours faithfully,

(Signed) ALEX. HILL & STEWART.

THE RECENT INCREASE OF DUTY ON WHITE LEAD.

The Nelson Daily News, in a recent issue publishes an interesting interview with Mr. James Cronin, of the St. Eugene Mining Company, on the above subject. We quote as follows:—

"The prompt action of the Liberal Government has done much towards helping the mining situation in the Kootenay. We have now something solid, and what is more, something permanent. Its results should be seen immediately and its results will be more and more apparent as the time goes on.

"For the last year, according to the figures given by Mr. G. O. Buchanan, and published recently in your paper, the output of the province, on which a bounty was paid by the federal government, was 27,000 tons. Of this amount 11,000 tons were sold in Europe and 16,000 tons marketed through the local smelters. This year there will be no such 11,000 tons of bounty ore sold in Europe. The bounty on export ore has ceased. Then it is the province of the smelters to dispose of, to market, the whole production. That is to say at least 27,000 tons.

"That is the problem, indeed. Now the total amount of lead used in Canada is about 16,000 tons. The new duties, which cover practically the whole of this Canadian market, will allow the Trail smelter and the other smelters to dispose of. in the Dominion, about 13,000 tons. There remains a difference of 3,000 tons. Perhaps I am too conservative in saying that the new duties, one way or another, will only cover 13,000 tons, but I like to be on the safe side. There are numberless ways in which the products of lead may and do yet come into Canada. Speaking as one of the outside public I put down that leakage at 3,000 tons.

"Last year, therefore, there were marketed in Europe 11,000 tons, in Canada 7,000 tons, and in the Orient, China and Japan, 9,000 tons. The new duties will give an added market in the Dominion of about 6,000 tons. Very well, then, it is apparent that during the year to come the marketer has to dispose of 27,000 tons, putting the production of lead at the same figure as that of last year. For this he has a market in Canada of 13,000 tons, in the Orient 9,000 tons and then there still remains a surplus of 5,000 tons which have to be disposed of, in Canada, in Europe, or in the Orient.

"Now, I have already explained that in the Orient the market was for 9,000 tons, and in Canada 7,000 tons, to which may now be added the additional 6,000 which is coming to us though the effect of the lead duties which are now being imposed. The European market, available to us during the last fiscal year, because of the bounty. is now apparently cut off. The problem seems, therefore, to be insoluble. But this is by no means the case.

"It must be remembered that the Orient market is something new to us. Not long since we had no share in it. Now we have. That market is due to the energy and acumen of Mr. W. H. Aldridge. Why, I do not know, but it is true, nevertheless, that the chief competitor of the British Columbia lead ores in the Orient market, Australia, is apparently dropping out of the competition and Mr. W. H. Aldridge is evidently the master of the situation. Australia is shipping to Europe and elsewhere. Therefore, we may look to an increased market in the Orient. Whether that will absorb the extra 5,000 tons, of which we have to dispose this year, remains to be seen. Mr. Aldridge could probably answer that question better than I. But you may remain secure upon this point, which is, that the St. Eugene will not curtail its shipments of ore because of the new duty or because of the cessation of the bounty upon exported lead ore. It is far more likely to increase the output.

"And this leads us into the question of the European market. But, be it remembered, before entering in upon this complicated phase of an intricate subject, that when the Orient is considered it must be regarded as the natural market of this country. Canada is nearer to the Orient than is any other country of the hemisphere in which we are living. The only possible competitor is the United States. But the United States is not a competitor. Its production of lead is about equal to the demand. In fact, it is slightly short and some lead has to be imported. Europe cannot compete. It is too far away. We can market our lead more advantageously than can Europe. Australia can be a competitor but, as I have already said, Australia is finding markets for its shipments other than the Orient.

"Now, European smelters are getting from all over the world much high grade silver ore. Any smelter man will tell you that in order to profitably smelt this, lead ore is wanted. But it must be lead ore of a high grade, 60 per cent. or over, otherwise the shipper is paying for much silica in his transportation rates. Lead ore of the description alluded to is favorably quoted by the European smelters. It is the dry ores that have to pay the high rates, just the reverse of the condition that obtains in this country. Hence the European smelters are giving a much more favorable rate than is paid by the local smelters. Again the price of lead is climbing up. Four years ago the price was around £11 and £12. Now it is higher than it has been for years past and is near £14, consequently mines which possess high grade lead ores might find it more profitable to ship to Europe than to ship locally.

"When the mines can make $5 to $6 better profit by shipping abroad than in having the output treated at home patriotism is liable to have to take a back seat.

"On the other hand, it is to be remembered that the bounty on lead obtains up to nearly £16. When lead has gone over £12 10s, it is the same to the lead producer because of the sliding scale of the bounty, as far as his pocket is concerned, up till the time it reaches £15 16s, 3d. Still the whole thing is a matter of figuring. The smelters here will have to come down in their prices. The Huntington-Heberlein process, the ability of getting a constant and regular supply of ore, may help them in doing this. Probably it will. The market, as I have shown you, will take care of itself. On the whole, the imposition of the duty will result in a permanent good to the lead mining industry of the Dominion.

"As to the other phase of the subject, that of fluxing of dry ores, that also is important. The ore of the Centre Star and of the War Eagle will run about 1 per cent in copper, the War Eagle probably a little better than that figure, the Le Roi probably better still. But to get clean slags it is necessary that the copper contents of the ore should be at least two per cent. If that is not there, then there is necessary the admixture of either more copper or of lead. Hence the greater production of lead in the Trail and other smelters will permit of the cheaper reduction of dry ores, whether those are gold-copper or silver-lead ores heavily intermixed with silica. For the reduction of lead a certain amount of silica is necessary. Hence the Rossland silicious ores will find that it is to their advantage to be smelted in a reduction works that is handling lead especially such silicious ores as are low in copper percentages.

"So it will be perceived that the question has an infinite number of ramifications and cannot be considered alone from any one point of view. But you may take this as a summary: The St. Eugene is more likely to increase than to decrease its output, that the War Eagle and Centre Star will ship just as usual, that I, as a layman, have no doubt as to the market being found, and that the increased price of lead will open the European market, possibly merely temporarily, and that the duties on the imported products of lead will give a permanent advantage, which cannot be lost, as long as they remain in force, to the mining industry."

MINING IN THE KOOTENAYS.

(From a Special Correspondent.)

There have been two events in the Kootenay during the past month which will leave their mark upon the history of mining in this province. The one is the transfer of the Gooderham interests in the Rossland camp and in the St. Eugene, and the other the successful demonstration at the Sullivan Smelter in Marysville of the practicability and economy of the Huntington-Heberlein roasting process.

It is probable that the former will settle all idea of an amalgamation of the Le Roi with the other interests for the present, although [illegible] nied by the officials of the Le Roi. It would seem to be probable that the mines and smelter will be under the general management of Mr. W. H. Aldridge of the Trail smelter, while Mr. James Cronin will remain in charge of the mining operations proper. As, however, the idea of the Trail smelter is to get as large a tonnage as possible, and as the Le Roi seems to be shut out from participating in that tonnage, it is more than probable that the War Eagle and Centre Star, especially the latter, will be provided in the near future with a better hoisting plant and equipped with a workmanlike shaft; for, until this is done, the mines cannot ship that quantity of ore which the smelter needs in order to manage the reduction of the ores on a more economical basis. A larger output of ore will necessarily mean a larger staff of men, and, as otherwise, Rossland is prospering fairly well with its properties and some new shippers are coming into the field, a period of prosperity seems to be ahead of that camp.

The Trail smelter, regarded as a copper producer, will be favoured by acquiring the ore of the St. Eugene, which will serve as a flux for some of the siliceous ores of the War Eagle and Centre Star. The lead production, however, is not so large as to make this use of silica very heavy, but what is used will help out the problem of the reduction of the gold-copper ores of Rossland.

Whether there will be any use made of the costly concentration works erected near Trail by the late management of the War Eagle and Centre Star is more than doubtful. In the first place it is claimed that with sufficient ore concentration is not necessary as smelting can be done so cheaply as to make the aid of concentration of doubtful value. Whether this will prove to be the case is a question that will be watched with interest, as the great problem is the getting rid of the silica in the ore. This could be washed out by water concentration, but in Rossland the problem is complicated by the apparent lack of water near the camp. Were all the mines and the city to combine, sufficient water would be brought in, but the undertaking would finally cost over half a million dollars, though a fifth of the amount would probably suffice for immediate needs. That is one reason why the Kirby concentrator was built 14 miles away from the mine at Trail. The advantage is doubtful, as it is undoubtedly cheaper to bring the water to the ore than vice versa. Of course the new combine is so favourably situated with regard to the Canadian Pacific Railway, that this disadvantage is modified in practice. Further, the concentrator is built on the level site type, with the consequence that all the ore has to be twice hoisted, which is uneconomical. Moreover, the machinery and process used is entirely unfit for the ores to be treated. Hence the concentrator is of little or no value to the smelter.

Other intelligence of importance is that the Huntington--Heberlein process seems likely to be adopted by the Nelson and Trail smelters. It is claimed by Mr. Max Heberlein that the roasting process does twice the work with half the labour, and that its effect upon the charging of the blast furnaces is such as to increase their capacity one-half more, at the same time reducing the amount of flux and of fuel wanted. A further advantage is that at least 50 per cent. more zinc may be admitted into the lead ores without penalizing the shipper. What this means to many mines in the Slocan whose ore carry from 5 to 15 per cent. in zinc—insufficient perhaps to justify separate treatment for the recovery of the zinc, but sufficient to justify serious deductions by the smelter—is self-evident. The general effect should be to reduce the charges at least 25 per cent., depending, of course, upon the character of the ore to be smelted, sometimes more, sometimes less.

This should settle the question of shipping ores locally. The complaint has been that the local charges are too high, and that the freight charges are too heavy, although there has been no satisfactory evidence adduced to show this anything like conclusively. The fact of the matter would seem to be that the Slocan has run ahead of its development. Mining is too often conducted upon too small a scale, and rarely has a mine shown sufficient ore ahead to enable it to make satisfactory terms with either railroad or smelter. Both railway and smelter want a guarantee of a certain amount of ore to be delivered regularly, and just so long as the mines are being worked, as it were, from hand to mouth, just so long will there be complaints and recriminations between the parties. However, with cheaper smelting rates, it is probable that the working of these mines will now be undertaken on a larger and therefore more businesslike scale, and heavy profits will be reaped by the shareholders.

IRON AND STEEL PRODUCTION IN CANADA.

The production of steel ingots and castings in Canada in 1904 was 148,784 gross tons, against 181,514 tons in 1903, a decrease of 32,730 tons. Bessemer and open-hearth steel ingots and castings were made in each year. Almost all the open-hearth steel reported in 1903 and 1904 was made by the basic process. The direct steel castings made in 1904 amounted to 6,505 tons. Canada has not made crucible steel prior to the present year.

The production of Bessemer and open-hearth steel rails in 1904 amounted to 36,216 gross tons, against 1,243 tons in 1903; structural shapes, 447 tons, against 1,983 tons in 1903; cut nails made by rolling mills and steel works having cut-nail factories connected with their plants, 99,000 kegs of 100 lbs., against 118,686 kegs in 1903; plates and sheets, 3,102 tons, against 2,450 tons in 1903; all other finished rolled products, excluding muck and scrap bars, blooms, billets, sheet bars, and other unfinished forms, 135,243 tons, against 118,541 tons in 1903. The total quantity of all kinds of iron and steel rolled into finished forms in Canada in 1904 amounted to 180,038 tons, against 129,516 tons in 1903. Of the 180,038 tons of finished iron and steel reported for 1904 about 126,850 tons were steel and 53,188 tons were iron.

On December 31, 1904, there were 18 completed rolling mills and steel works in Canada. In addition, three plants were being built and two plants were projected. Of the completed plants, two were equipped for the manufacture of steel castings only, five for the manufacture of Bessemer or open-hearth steel ingots and rolled products, and eleven for the manufacture of steel castings by a special process, one for the manufacture of open-hearth steel ingots only, and one for the manufacture of merchant bar iron, railway spikes, etc. One of the projected plants is to be equipped for the manufacture of skelp and bar iron, and the other for the manufacture of wire rods.

Of the eighteen completed rolling mills and steel works in Canada on December 31, 1904, three were located in Nova Scotia, five in Quebec, nine in Ontario, and one in New Brunswick. The building plants are in Nova Scotia, Ontario and Manitoba, and the projected plants in Ontario.

The production of iron ore in Canada in 1904 amounted to 312,286 gross tons, against 235,977 tons in 1903, and the production of coal in Canada in 1904 amounted to 6,704,232 gross tons, against 6,824,999 tons in 1903.

IRON MINING IN NOVA SCOTIA.

Replying to the leading article from the Halifax Chronicle, on the subject of Nova Scotian Iron Ore, the Maritime Mining Record remarks:

"Twenty or less years ago, before thousands of dollars, reaching up into a hundred thousand, had been spent in searches for large or moderately large bodies of good ore, the popular belief that these deposits existed might have been justified, but of late years, after large expenditures and diligent search, one is scarcely justified in jumping to the belief that Nova Scotia possesses ore in rich abundance. Much prospecting and exploratory work has been done in the past fifteen years, and it has to be confessed that results have not been encouraging. Six years ago, because the Record called for proof of the existence of large bodies of ore, it was rapped sharply upon the knuckles. But time brings its revenge, and one of the Record's former assailants, the Eastern Chronicle, now accepts the view which it scolded the Record for holding. Indeed, it goes further than the Record went, further than the Record is willing to go. We still hope that Nova Scotia may be proved to be rich in iron. The Record does not agree with the Chronicle in its theory that bounties on iron produced is the best way of encouraging ore mining. Such a policy would be utterly ineffective. Suppose the Government offered fifty dollars a ton bonus on billets made from native ore, not a billet would be made by the two big companies, for the reason that their patience in the hunt for native ores has all but been exhausted. The Record has assurances that the two big steel companies have during the past five years been most assiduous in their efforts to come across large bodies,—bodies of commercial value—of ore and have failed. It is asserted that the Dominion Iron & Steel Co. have expended a hundred thousand dollars in the search, and it is generally known that at Brookfield, Arisaig, and other points, it cost the N. S. Steel & Coal Co. a pretty penny. When operations began at Brookfield, the belief was that there was abundance of ore. It proved to be a pocket of just twenty thousand tons. The Arisaig deposit fell far short of Brookfield. Everybody admits there is ore at Nictaux, but to-day it is not believed to be of the great value and extent as held to be thirty years ago. Outside of Annapolis, where there is a deposit of great extent, not one at this present time can be named, and in saying so, the Mining Record is not forgetful that it is supposed to exist in large quantity near Londonderry. One interested in the progress of the steel and iron industry says that the local government would be safe in offering a bonus of fifty thousand dollars for the first fifty thousand tons of ore taken out of an ore mine in Nova Scotia, Annapolis excepted. The Record for a time thought the Steel companies having large deposits in Newfoundland were not honest in their search for native ore. We do not think so now, being convinced that the companies are really desirous of securing ores in the province. And in proof that the companies are honest in this respect, the Record is in a position to say that five cents a unit will be paid by them for suitable ore landed at the port nearest their works. We believe if the ore contains as low as forty-five per cent. of iron, and has not too much sulphur, phosphorus, or silica, it will be bought by either of the two big companies. If then, there is iron in the province, and holders of the ore areas are assured of from $2.25 to $2.75 per ton, why is mining not actively prosecuted. The Record regrets to say it is afraid there can be but one answer, viz., the ore has not yet been struck."

ONTARIO MINING INTELLIGENCE.

(From our own Correspondent.)

The Ontario Government is considering the building of another government railway, through the North nickel and Hutton iron ranges, to extend through the Vermilion Valley to the Grand Trunk Pacific, and to connect at Sudbury with the Canadian Pacific, the James Bay (Canadian Northern) and the Manitoulin and North State railways. They also contemplate assisting a large custom smelter at the junction. Such a railway would open up a vast mineral region. The success of the Temiskaming and Northern Ontario Railway affords encouragement to the undertaking of further government railways.

The Tharsis Sulphur and Copper Co., of which Sir Charles Tennant, Bart., the wealthy chemical manufacturer, of Glasgow, is chairman, has decided to extend operations in Ontario. It has been working under an option on a property in Northern Ontario which promises so well as to warrant the company in extending its operations. It will operate for copper, and is considering the manufacture of sulphuric acid, being on the lookout for pyrites for that purpose. The company has large resources at its disposal, and works mines in Spain. It has during its existence paid 733 per cent. of its capital in dividends, besides accumulating larger resources. The operations of such a company means much for the province.

There is a report current at Kenora that the Sultana, Ophir and Coronation gold mines are to be amalgamated and worked with a 100-stamp mill. Winnipeg and English capitalists are said to be back of the arrangement. Negotiations are being carried on with the Keewatin Company, for electric power from their development four miles from Kenora.

Information has reached us from London, England, that the Monde Nickel Co., operating the Victoria mine property, in the Sudbury district, has declared a dividend of 7 per cent. on its preference stock, and 6 per cent on its common stock, after wiping out its preliminary expense account. This is the first dividend which has been paid on the common stocks, and the Monde is one of the few English mining companies operating in Canada which have been successful. Sir George Drummond and Mr. James Ross, of Montreal, are the two Canadian directors of the company.

COPPER MARKET CONDITIONS.

In their last circular, Messrs. D. Houston & Co. report as follows:—

Demand for copper was in heavy volume during the past month, and both domestic consumers and European buyers purchased liberal quantities. Recent active business covers deliveries extending over the next three or four months, and the importance of these transactions furnishes a new element to the tone and strength of the market. Much of the business was at 15 cents for lake and electrolytic. An occasional shading of these figures was made although for quick delivery or metal laid down at foreign ports, a premium was a condition required.

The extensive export movement is the most impressive feature of the copper situation, and this is the main factor in the preservation of market firmness. The foreign absorbing power is astonishingly great for volume and persistency. Shipments to Europe and China are taking regularly much more than half the production of the United States, and it is fortunate for foreign consumers that the exportable surplus of this country is sufficient to permit these monster shipments. Exports of copper for the first six months of his year amount to 127,817 tons, and if continued at the same rate for the balance of the year the total exports for the twelve months of 1905 would exceed the entire United States production six years ago.

Consumption of England and France for the first five months of this year is returned at 41,284 tons, against 51,858 tons for the same months in 1904. The consumption of foreign copper in Germany for the first four months of this year is stated at 27,759 tons, compared with 38,208 tons for same period last year.

Exports of copper from the United Statees, in tons of 2240 pounds fine, as per Metal Exchange returns, were as follows:—

	1905.	1904.	1903.
January	21,245	29,085	10,478
February	17,508	17,073	8,935
March	21,073	22,852	12,941
April	24,121	13,983	13,670
May	23,758	14,772	9,207
June	20,112	16,279	8,606
Total, six months	127,817	114,044	63,837

Imports of copper into the United States during the first five months of this year were 36,300 tons, against 32,775 tons for the first five months of 1904.

Total visible supply of copper in England and France and afloat thereto from Chili and Australia on July 1 was 18,050 tons, against 17,250 tons on June 1. Supplies for the month of June were 26,500 tons and deliveries 25,700 tons.

The following statement, taken from the original documents published by the Chinese imperial customs authorities give the net imports of copper in slabs, ingots and unclassed copper during the period 1901-1904, in pounds:—

	1901.	1902.	1903.	1904.
Ingots, slabs	1,364,800	3,069,266	10,014,800	32,383,600
Unclassed.	152,800	147,334	129,866	2,082,400
Total	1,517,600	3,215,600	10,144,666	34,466,000

The exports of copper from the United States to China during 1904 amounted to 10,403,034 pounds. The first four months of 1905 were as follows:—

	Pounds
January	1,124,017
February	9,169,222
March	6,973,871
April	18,301,055

THE LIEGE EXHIBITION AND MINING CONGRESS.

Our special correspondent writes: The Canadian Mineral Exhibition is displayed in a manner similar to that adopted at St. Louis. There are several large piles of British Columbian ores of copper, galena, coal, etc., while in addition there is a good display of nickel, cobalt, silver, iron, graphite, and building material. Another feature of this exhibit is the excellent display of alluvial gold and quartz. In addition, there are numerous cases containing the different varieties of these minerals, and others of minor importance. The exhibit is attracting a great deal of attention, and especially of mining men and metallurgists, who are numerous in the Liege district. The International Congress of Mines, Metallurgy, Applied Geology and Mechanics opened last week, and was attended by over a thousand specialists in these respective branches of science, including some of the most prominent scientific men and engineers from almost every country on the globe, several countries being officially represented. This however was, unfortunately, not so in the case of Canada. The session continued throughout the week, and a number of valuable papers were read and discussed, while there were numerous excursions and local functions. Many of the members of the Congress have visited the Canadian Pavilion, and all expressed admiration of the mineral potentialities of the Dominion, as signified by our display. The Canadian Exhibit is in charge of Mr. L. Broadbent, of the Geological Survey, and Mr. J. Obalski, M.E., of Quebec, who are kept busy replying to the numerous enquiries. Canada is the only country showing a representative exhibit of minerals, and consequently this exceptionally fine advertisement of our mineral wealth is likely to be productive of most valuable results.

ASBESTOS IN BRITISH COLUMBIA.

Mr. A. M. Evans, M.E., who was recently retained to report on an alleged discovery of asbestos in the Lardeau district, reports that the formation in the locality is favourable, and that he found good specimens of mineral, of which there was sufficient in sight to justify the conclusion that the property might be profitably worked to supply the coast markets. The claims, which are situated about 300 feet above Kootenay Lake, behind the town of Gerard, comprises two locations, which were originally staked as silver-lead mines.

MINING NOTES.

NOVA SCOTIA.

A meeting was held in Sydney, early in July, between representatives of the Cape Breton Coal, Iron & Railway Co., and committees from the City Council and Board of Trade, in order to discuss matters in which the Company and the City of Sydney are jointly interested. The company is asking the City Corporation for running rights over the Intercolonial Railway from Coxheath to Barrack Point, where it is proposed to construct a shipping pier. The company is also asking for free site at Vancouver Park, for cheap water and exemption from taxation, for a term of twenty years. It is said that this company, which is in a very strong financial position, contemplates expending $20,000,000 in the establishment of shipbuilding plant, and other works at Sydney. At a subsequent meeting of the City Corporation it was decided to grant the company exemption from taxation for twenty years and to provide water at the usual rates charged to such industries. The other concessions asked for, however, were not voted upon.

The mine employees of the Cumberland Railway and Coal Co., at Springhill, went out on strike during July.

The Nova Scotia Steel & Coal Co. has in contemplation the project of moving the plant from New Glasgow to Sydney, it being thought that economy might be effected by the centralization of the company's works.

The first clean-up of the Beaver Hat Gold Mining Co.'s mill, Guysboro County, was made on July 8th, and resulted in the production of a 41 oz. gold brick. The property is said to be looking extremely well, and the result of this first test run is regarded as highly satisfactory.

The first Portland Cement Works to be established east of Montreal are now in operation at Sydney. The works are owned by the Sydney Cement Co., the plant having a capacity of 500 barrels every twenty-four hours.

It is estimated that the Dominion Steel Co. will produce 100,000 tons of steel rails this year, upon which a profit of $14 per ton —$7 on the manufacture and $7 for the bounty—is expected to be realized.

The new steel plant of the Nova Scotia Steel Company at Sydney includes 5 hearth furnaces. The cost of building has been $78,000; while each furnace cost in the neighborhood of $100,000.

Since operations were commenced at the Dominion Iron & Steel Company's mill, shipments of steel rails have been steadily made, and one day during July a shipment of over 500 tons of rails, in addition to a considerable tonnage of pig iron and wire rods was consigned to Montreal.

QUEBEC.

Mr. J. E. Hardman, who recently spent several weeks in the new Chibogamoo district of Quebec, speaks very enthusiastically of the mining potentialities of that region. There have already been found deposits of gold, asbestos, copper and iron ore, and Mr. Hardman states that, in his opinion, the asbestos found is superior in quantity and quality to that existing at Thetford and Black Lake. On Asbestos Island he counted between 70 and 100 distinct veins these ranging in width from half an inch to five and one-half inches. There is, he states, sufficient asbestos on the island (which is but three-quarters by a quarter of a mile in extent) to supply the whole world, at the present rate of consumption, for many years. The Chibogamoo Mining Company has here opened, within the space of half a mile, six pits, in which there are fine showings of asbestos. Beyond Lake Obatogoman the rock formation is very similar to that obtained in the Temiskaming district of Ontario, where valuable deposits of cobalt and silver have been found during recent months, and Mr. Hardman brought back with him some good specimens of these minerals. A deposit of quartz, 40 feet wide, which was exposed for a distance of over 400 feet, and yielded values of $10.00 per ton, was also discovered on the Chibogamoo Company's property. Mr. Hardman has kindly consented to prepare for the Mining Review a comprehensive article describing this region and its mineral possibilities, which will be published, we hope, in our next month's issue.

A strike of the mill hands employed by the Bell Asbestos Company, and by those employed at the Johnstone Mine at Thetford was declared on the 4th of July, this being occasioned by the fact that while the men in the pit had received an increase in wages from $1.25 to $1.50 per day, while an increase of only 10 per cent. had been granted to the mill hands. The management of these properties have since secured other labourers to take the place of the strikers.

ONTARIO.

For the past two years mining in the vicinity of Belleville has been in a somewhat depressed condition, owing to the suspension of operations at the plants of the Canadian Gold Fields, at Deloro, and the Cordova Exploration Company in Belmont Township. Recently, however, prospects have materially improved, and it is believed that by the adoption of more modern methods of working, a number of new properties will be opened, while operations will also be resumed at the older mines. In Barrie Township, the Star of the East, which has been productive for several months past, is being extensively worked, and in the near future the capacity of the plant is likely to be increased. At the Bannockburn, the Craig Gold Mining & Reduction Company are employing some 80 men. The first Merrill mill in Ontario has been installed at this property, and by the first of September it is expected that from between 125 to 150 tons of ore a day will be crushed. This ore is said to average $5.50 per ton in value. The property is developed by five shafts, sunk to a distance of from 150 to 200 feet on the main vein. Negotiations are meanwhile pending for the acquisition of the Cordova mine, under a consolidation arrangement with the Canadian Gold Fields at Deloro. The Richardson property, too, which is the first property at which gold was discovered in Hastings, has been acquired by Mr. W. A. Hungerford, who proposes to thoroughly exploit it.

The regulations governing mining in the new Temiskaming mining division are closely similar to those in force in the Michipicoten mining division. The territory comprised in the district is bounded on the east by Lake Temiskaming, and the Ontario and Quebec boundary as far as Lake Abitibi. The northern limit runs from Lake Abitibi due west from a point eight miles north of the outlet of the Abitibi River to the Nipissing and Algoma boundary, then jogs east to the Great Northern bend of the Montreal River, whence it follows the stream to the southern limit of the Township of Coleman. From this point the southern

boundary runs eastward to the boundary of the Lumsden and Booth timber limit, and thence to the third and fourth concessions of the Township of Lorrain.

A petition for the winding up of another Ontario Mining Company has been filed at Osgoode Hall. This concern, The North Shore Copper & Smelting Co., was incorporated in 1903, with a capital of $250,000, of which $113,000 was paid up. The petitioners state that the company has now no assets except certain mining properties near the Bruce Mines, which, it is alleged, were purchased for $5,000, and are now mortgaged for $3,500.

A writ has been issued on behalf of Mr. W. H. Garvey, of Toronto, to set aside the judgment obtained by Mr. W. G. Pollock, of Cleveland, Ohio, against the New York Canadian Copper Co., for money alleged to have been advanced. Under these judgments the assets and properties of the Company in Thunder Bay were recently sold. Mr. Garvey advances the claim that the sale was fraudulent and illegal.

In the Temiskaming mining district new discoveries continue to be made almost daily. Prof. Miller, the Provincial Geologist, who recently returned from a three weeks' visit of inspection to the district, reports that the new silver-cobalt mines at Kerr Lake, promise exceptionally well, the ore yielding $3,000 per ton. New rich veins are also being constantly uncovered, both at Kerr Lake and at Cobalt, and in view of these numerous favorable reports a large influx of prospectors to the district is taking place.

Preparations are now well under way for the erection of the plant of the Canadian Tin-plate and Sheet Steel Co. at Morrisburg. The company is arranging, it is said, to bring out from South Wales 200 skilled tin plate and sheet steel workers. Meanwhile, capital is being invited to invest in the venture with a view to placing the company in a stronger financial position than was originally contemplated, with a capital of $1,500,000.

Mr. L. C. Kerr, chief geologist of the party sent to make the explorations in New Ontario, reports the discovery of a large new tract of clay land, in the great bend of the Mattagami River, some 200 miles north of Sudbury. Mr. Kerr also reports having met a prospector returning from the Porcupine River, who carried with him promising samples of gold-bearing quartz and hematite.

Owing to the demand for iron properties in Northwestern Ontario, prospecting for this class of property is now very active. At Atikokan the plant is being installed for the extraction of ore for a Port Arthur blast furnace, while prospecting by diamond drilling is being carried on by two separate undertakings in this field.

A winding-up order has been granted to the applicants in the case of the National Share Copper & Smelting Co., subject to a week's delay. The applicants claimed that they could get no information as to operations, the personnel of the directors not even being known.

The Hollindia Lead Mine, near Bannockburn, is also yielding good results, while a sulphide mine, employing 60 men, is in operation near Bogart, shipments being made at the rate of from 12 to 15 cars per week. Copper sulphides affording excellent assay results have been discovered on the Coe property, near Eldorado, and an option has been secured thereon by an American company.

At Copper Cliff a site has been cleared for a new smelting plant to be shortly erected. The buildings will be frame timber, covered with galvanized iron, the contract having been let to Mr. J. Laberge. All mill machinery has, meanwhile been purchased, and it is expected that the plant will be in operation within three months' time.

The Detola Development Company, of Toledo, recently organized to operate in the Manitou district, is negotiating for the purchase of the Paymaster claim, adjoining their property.

The Elmore Oil Concentrating Plant at the Massey mine is now treating about 35 tons of 4½ per cent. copper ore every 24 hours. The mill is producing from 7½ to 8 tons of concentrates, averaging 21 per cent., daily.

At the Sultana mine about thirty men are now being employed. The mill is only being run by day shift, the mine being full of water to the fourth level. On the 2nd and 4th levels there are at present five air drills working.

A promising discovery of gold is reported from the township of Barrie, Fontenac County, near Kingston, on the property of the Big Dipper Mining Co., a body of quartz having been uncovered showing much visible gold.

The Western Canada Cement & Coal Co. was incorporated during the month with a capital of $1,250,000, and headquarters at Ottawa.

It is reported that the Hamilton Nickel Company contemplate the early erection of a smelter in the iron range.

BRITISH COLUMBIA.

The Coast.—It is reported from Victoria that the Tyee Copper Co. at Mount Sicker, proposes to sink to a depth of 1,000 feet, if necessary, to endeavour to locate the main ore body. The programme has, meanwhile, been prepared for the prosecution of extensive development work.

It is reported that the iron mines of Texada Island are to be reopened this summer. These mines were worked some years ago, and shipments of ore made to San Francisco. The ore will now be shipped to the Irondale smelter in Washington.

Kamloops.—The small smelter plant at the Iron Mask mine was completed during the month, and operations commenced. There has been some activity in this district of late.

Atlin.—The first clean-up of the Northern Mines, Ltd., resulted in the recovery of 40 oz. Four shifts are now being worked at the property, and the gravel is said to be proving extremely rich. The new steam shovel has been shipped, and will doubtless be in position and ready for operations by the 15th of July.

Dredging operations in this district are now well under way. The British American Dredging Co., it is said, contemplate enlarging the plant at Pine Creek up to 1,000 H.P. It is also proposed to install a shovel and two electrical locomotives to draw the dirt to the sluices at Tar Flats. The British Columbia Dredging Co. are completing the construction of a dredge on Spruce Creek.

The Atlin Claim, in a recent leading article, discussing the prospects of the district for the year, states as follows:—"The output is increasing and, not only that, but there promises to be very little litigation, for which we are truly thankful. Prospecting will be prosecuted in the O'Donnell valley on a large scale, and the results will prove whether that territory, which is three times as large as our present gold producing area will be workable or not. There are thousands of acres in that valley which have never been touched. Some prospecting has been done on Bull Creek and further down the O'Donnell Valley with satisfactory results, but these are only fly specks on a valley over fifty miles long and all virgin soil.

Slocan.—More interest now appears to be taken in mining in the vicinity of New Denver, where negotiations are in progress for the purchase of the Mollie Hughes and California properties, while also New York investors contemplate the purchase of the Hewitt mine, near Silverton. On this latter property some four miles of development work has been done and a large body of ore blocked out.

The American Boy recently commenced the shipment of zinc ore, which was produced in the course of development work. It is said, however, that there is a large available tonnage of this ore on the property, which may presently be turned to profitable account. Zinc concentrates continue to be shipped by the Slocan Star mine at the rate of 750 tons per month. These concentrates are said to average 35 per cent. zinc and 45 oz. silver.

East Kootenay.—The Aurora, a promising property in the Moyie District, has been acquired under an eighteen months' option by Messrs. McKay & Wilson, of Portland, and development work is to be undertaken immediately. The Aurora claims were discovered in 1894, but relatively little development work has yet been done.

Nelson.—Operations have been resumed at the Crawford Bay Iron Mines, on Kootenay Lake. As yet, however, these properties have not been productive.

In an interview with the Nelson Daily News, Mr. T. H. Tretheway, manager of the Molly Gibson mine, stated that the company had provided the sum of $70,000 for the development of the mine, which is to be resumed at once. The re-organization of the company was effected on the 30th of June.

Lardeau.—Referring to the close-down of the combination silver mill of the Ferguson Mines, Limited, the Kootenay Mail, published at Revelstoke, remarks as follows:—

"The worst piece of news the Lardeau district has experienced for some time came as a thunderbolt, when it was announced that the mill and chloridising plant of the Ferguson Mines, Ltd., operating the Nettie L. and Silver Cup mines, had been shut down and 120 men thrown out of employment. Nor does it appear to be a merely temporary affair, as the telephone lines were taken down and other signs of a long shut-down are evident. The reason ostensibly given is that the reserves of milling ore have been exhausted, but that is all nonsense, as, although the second grade dumps have been pretty well worked out, the workings are full of that class of ore which was not taken out of the mine by the Sunshine, Ltd., when it was mining only the shipping grade of ore. It is feared the true reason is that the company found itself unable with the plant installed to make a profit ment will be pushed on and modifications made to the mill plant with on the ore it handled in the mill. Other reports say further develop- a view to ensure better results."

A very rich strike of ore is reported to have been made on the Smith & Rogers property, which is under bond to the American Eagle Mining Co. About 200 pounds of ore taken from this find showed, after roasting, much visible gold. There have been several deals in this district lately, the "Morning," "Homestake" and "Pauline" claims on Rapid Creek having been bonded to Spokane investors, while Messrs. Marquise & Gilbert recently received a cash offer of $10,000 for their property at Poplar Ceek.

Machinery for the Silver Dollar mine recently arrived at this property, and the construction of the new compressor and mill building is now in progress.

The Lardeau Review states that work is being vigorously prosecuted on the Sunshine tunnel of the "Silver Cup"' and that a promising ore body was recently encountered.

Rossland.—A remarkable story is reported from Rossland, by the Miner. During a recent thunderstorm, it is said, the lightning penetrated to the 500-ft. level of the Josie mine, giving a miner who was working in the drift, some 2,000 feet from the shaft, so severe a shock that the man was rendered almost unconscious. At the 900-ft. level a carman was at the same time rendered insensible, while three other miners in different parts of the mine also felt the shock. It is supposed that the lightning, after striking the head works, passed down the iron air line which branches off at the various levels.

Atlin.—The first clean-up of the season of the McKee Creek Hydraulic resulted in a yield of 480 oz. Large quantities of dirt are also being moved on the North Columbia Gold Mining Co.'s property, and at the Columbia Hydraulic Co.'s property on Spruce Creek. The sluicing of the winter dumps on Spruce Creek has, meanwhile, been completed.

Slocan.—According to the returns of Mr. G. O. Buchanan, the lead bounty commissioner, for the fiscal year ending June 30th, the total lead production for the Kootenays for this period was £55,752,019. Of this, 11,000 tons were exported, and the remainder, nearly 17,000 tons, smelted in British Columbia. Under the act, the total bounty earned is estimated at $340,000.

The Cork mill on the south fork of Kaslo Creek, is now in steady operation, employing a force of twenty men. Recently, in the lower workings of the mine, a strike of two feet of concentrating ore was encountered. The ore body is now 20 feet wide.

Referring to the success of the "leasing" system, which has been more general during the last year or so in the Slocan district, the Sandon Mining Review calls attention to another successful result in connection with the Flint mine, on the south fork of Kaslo Creek. A number of Sandon residents contributing monthly sums to keep two miners working at this property, under lease, the ore body was encountered some time ago, and recently, while sinking in the tunnel, a parallel ore shoot was encountered. The original ore body was about 18 inches wide, and yielded 71 per cent. lead and 100 oz. silver. while the new shoot is 2½ feet wide, and assays 350 oz. silver and 65 per cent. lead, while grey copper is also present. Already some shipments of rich ore from this mine have been made.

At Hammil Creek, the Argenta Mine, Limited, contemplate the early installation of a compressor plant and mill.

Boundary District.—An interesting struggle has been in progress for the last few months between the Chicago and local interests to secure control of the Providence mine. Among other incidents, the fore-

man placed in charge of the property by the representatives of the Chicago shareholders, was last month imprisoned, on the charge of trespass, by the Greenwood directors, and a number of injunctions have been served on both parties An action is now to be shortly tried to set aside the purchase of the Dimond fraction, for which stock was issued without the consent of the Chicago directors If this stock was legally issued, it is understood that the Greenwood shareholders will have a majority interest in the property, but not otherwise

The Granby Co is now passing through the most prosperous period of its career, and it is estimated that profits are at present being made at the rate of $75,000 per month. The company is said to have a large cash surplus, and it is expected that dividends at the rate of 4 per cent. per annum will be resumed at an early date.

At the Seattle mine, in the Grand Forks division, which is now being developed by tunnelling by the bondholders, Messrs. Pemberton & Hunter, an ore body of 3 feet wide and carrying a considerable percentage of copper, has been encountered at a distance in of 340 feet.

East Kootenay.—At the St. Eugene mine profits are now being made at the rate of between $70,000 and $80,000 a month. A new 30-drill air compressor was originally installed at the property.

Steady production is being made by the Sullivan mine, from which 140 tons daily is being extracted, and, in addition, development work is being prosecuted.

Rossland.—The Rossland Miner states that "the payrolls for the month of June for the mines, smelters, saw mills and for those working on the pole lines of the West Kootenay Power & Light Company at Rossland, aggregate the very large sum of $144,200. The pay-rolls for the mines for June aggregated $83,200, or at the rate of $998,400 per annum. The Centre Star is increasing its pay-roll considerably, for while the amount expended by that company in April was $19,400, for June it reaches the sum of $21,000. From the way in which the mine is developing the pay-roll of this mine is to be still further increased. This will be particularly the case when the work of deepening the shaft from the ninth level is commenced. The Le Roi should also materially increase its pay-roll when it begins to deepen its shaft from the 1,250 foot level to the 1,550 foot level, which will soon be necessary in order to develop its new ore shoot. The same will be the case with the Le Roi 2 when it begins to deepen its shaft from the 900 foot level."

The first shipment of concentrates has been made to the Northport smelter from the Le Roi experimental concentrator plant, which it is expected will now be kept in steady operation.

Satisfactory reports continue to be received of developments at depth in the Centre Star mine, where ore of good grade is being opened up at a depth of 1,550 feet.

The lead stack at the Trail smelter is to be put in operation this month, using St. Eugene ores. It is also proposed to increase the capacity of the lead refinery to 50 tons a day, the product being shipped to the corroding works in Montreal.

The West Kootenay Power & Light Co. have ordered 25 carloads of cable, to be used in transmitting electrical energy from Upper Bonnington Falls to the Boundary district. The cable to be used will be about half an inch in diameter, and contain six No. B. & S. wires wound round a jute centre.

Lardeau.—It is reported that a rich strike has been made on the Swede group, one of the properties of the Great Northern Mines Co., operating at Poplar Creek. A quartz lead of between 20 and 24 inches in width, and carrying some gold values, have been uncovered for 50 feet. At a meeting of directors of this company, held in Nelson during the month, it was decided to organize a new company to take over the Swede, and possibly the Lucky Jack groups.

In the tunnel being run on the Silver Cup mine, a promising vein was crosscut, the ore from which was found to carry higher values than had yet been obtained in this mine.

Cariboo District.—The first clean-up of the Consolidated Cariboo Hydraulic mines, at Bullion, resulted in the production of a gold ingot the value of which is estimated at $25,000. Operations at the mine have been carried on for one month only this season, with but one shift working. The driving of the rock tunnel, however, is being prosecuted, and the work it is thought will be completed before the winter sets in.

Nelson District.—The announcement made by the local press that the Hunter V. mine had been closed down indefinitely is incorrect, as operations will be resumed when the necessary additional capital required shall have been subscribed.

The Coast.—The discovery of a free milling quartz is reported to have been made near Usulet, on the west coast of Vancouver Island.

YUKON.

News was recently received at White Horse of new gold discoveries on Willow Creek in the Nisulin district, nuggets having been found to the value of as high as $7.50, and it is believed that this locality will afford another promising class of mining area. Directly the news of these discoveries became known, a rush of miners took place to the localities, and 83 applications were made to the mining reporter for claims. Willow Creek is about 100 miles east of White Horse, and is reachable by way of the Hootalinqua River route.

On the Anderson concession, on Hunker Creek, five self dumpers are now at work, and a force of 100 miners employed. It was the intention to install a dredger upon the property this season, but the order was unfortunately delayed until too late.

Since the installation of the new hoisting engines at the Treadwell mine, some record achievements in the matter of daily output are reported to have been made. Thus in one day of ten hours 3,000 tons of rock was hoisted, exceeding any previous daily production made by 300 tons.

A dredger, with a capacity of 1,000 yards a day, has been ordered for the Bonanza Basin Gold Dredging Co. This dredge, which was supplied by a Chicago firm, is said to be one of the largest of the kind in the north

In the Alseck district some 300 miners are now at work, but the only important undertaking is that on Bullion Creek, where hydraulicing on a large scale is being undertaken by Mr. J. D. Breeze, of New York, who last year secured by purchase and lease 80 claims on Bullion Creek.

NOVA SCOTIA COAL SHIPMENTS, JUNE.

DOMINION COAL COMPANY, LIMITED.

	Output	Shipments
Dominion No. 1	53,259	
Dominion No. 2	44,423	
Dominion No. 3	35,949	
Dominion No. 4	53,707	
Dominion No. 5	74,700	322,285
Dominion No. 6	3,971	
Dominion No. 7	16,038	
Dominion No. 8	20,447	
Dominion No. 9	34,403	
	336,897	332,285
Shipments, June, 1904		347,357
Decrease, June, 1905		15,072
Shipments to United States, June, 1905		49,600
Total shipments, 6 months, 1904		1,218,525
Total shipments, 6 months, 1905		1,156,586
Decrease, 6 months, 1905		61,939

CUMBERLAND RAILWAY & COAL CO.

Shipments for June, 1904	39,365
Shipments for June, 1905	31,183
Decrease for June, 1905	8,182
Total shipments, 6 months, 1904	204,543
Total shipments, 6 months, 1905	187,675
Decrease, 6 months, 1905	16,868

NOVA SCOTIA STEEL & COAL CO.

Sydney Mines.

Shipments for June, 1905	65,443
Shipments for June, 1904	60,549
Increase for June, 1905	4,894

Marsh Mine.

Shipments for June, 1905	4,299
Shipments for June, 1904	4,884
Decrease for June, 1905	585
Total shipments, 6 months, 1905	206,376
Total shipments, 6 months, 1904	196,653
Increase, 6 months, 1905	9,723

INVERNESS RAILWAY & COAL CO.

Shipments for June, 1905	16,357
Shipments for June, 1904	25,576
Decrease for June, 1905	9,212
Total shipments, 6 months, 1905	56,081
Total shipments, 6 months, 1904	74,669
Decrease, 6 months, 1905	18,588

INTERCOLONIAL COAL CO.

Shipments for June, 1905	16,693
Shipments for June, 1904	23,581
Decrease for June, 1905	6,788
Total shipments, 6 months, 1905	88,089
Total shipments, 6 months, 1904	121,368
Decrease, 6 months, 1905	34,279

ACADIA COAL CO.

Shipments for June, 1905	24,826
Shipments for June, 1904	23,624
Increase for June, 1905	1,202
Total shipments, 6 months, 1904	123,097
Total shipments, 6 months, 1905	115,291
Decrease, 6 months, 1905	7,806

COAL MINING NOTES.

NOVA SCOTIA.

Operations have been resumed on a small scale at the Port Hood colliery, Cape Breton.

The Dominion Coal Company has declared a dividend, at the rate of 7 per cent. on the company's preferred stock, for the quarter ending July 31st.

Production is about to commence from Dominion No. 6, one of the Dominion Coal Company's collieries, six miles east of Glace Bay. The last slope has now reached a depth of 1,400 feet, and the northern slope about 1300 feet, or in each case below the second levels. Up to the present time the operations have been confined to development work; no rooms have yet been broken off, nor is it the intention to do so until two more lifts are gained, or until 2,600 feet in each case has been reached. The colliery will then have a producing capacity of 2,800 tons daily, or the equivalent of reserve if night shifts are worked. The colliery will be ready to produce that quantity by May 1, 1906.

BRITISH COLUMBIA.

It is reported that Mr. D. C. Corbin has secured an option on a very valuable coal property, consisting of five or six partially developed locations north of Michel Creek, East Kootenay.

The Crow's Nest Pass Coal Co. recently shipped a trial consignment of 2,000 tons of coal from No. 2 mine at Coal Creek, for use on board the steamer Dakota on her maiden trip to the Orient. Should the coal prove satisfactory, a large bunker is to be built at the Great Northern Company's wharves at Seattle, from which the company's steamers will be regularly supplied with fuel from these collieries.

A very fine specimen of coal from the Crow's Nest Pass Coal Co.'s No. 2 mine, Coal Creek, measuring 3 x 4 x 7 feet, has been placed on exhibition at the Lewis & Clark Exposition at Portland.

It is reported that the use of loose blasting powder is to be discontinued in the Crow's Nest Pass Co.'s mines, and one of the explosives sanctioned by the Provincial Government—probably roburite—substituted therefor.

The situation at the Western Fuel Company's collieries at Nanaimo remains practically unchanged, the feud between the United Mine Workers and the Western Federation of Miners showing no abatement. The local members of the United Mine Workers recently attempted to call out the men working at the Brechin and Northfield Colliery if the company still refused to officially recognize this labour organization. The Western Federation, however, have issued a notice stating that this organization has no grievance with the company in respect to the Brechin workings, and the miners of these collieries have decided by vote to continue working.

At the Wellington Extension collieries, on Vancouver Island, production is now being made at the rate of about 1,200 tons per day. It is probable that the company will shortly increase the working force at these mines if the San Francisco market holds good, as, owing to the trouble at Nanaimo, only about 800 tons of coal daily is being produced there.

An improved system of ventilation is being installed at the Departure Bay coal mine, Vancouver Island, while other changes are also being made to enable the loading of ships at the wharf by the use of automatic screening and loading machinery to displace manual labour. It is intended to equip the mine with German coal-cutting machinery, and the coal will be mined so that there will be no waste.

A recent despatch from British Columbia states that the United Mine Workers have succeeded, in spite of the opposition of the Western Confederation of Miners, in closing down the Western Fuel Co.'s Brechin colliery, thus all the coal mines at Nanaimo are now inoperative.

Mr. W. H. Hall, who is superintending the development work on the coal properties at Quilchena, owned by the Diamond Vale Coal Company, states that the seams uncovered aggregate some 60 feet of workable coal. The company is now exploring the property with a diamond drill.

MINING MEN AND AFFAIRS.

Mr. S. Davis, of Butte, Montana, has assumed charge of the Cork mill in the Slocan district, B.C.

Mr. W. B. McInnes, the new Commissioner of the Yukon, has arrived at Dawson, where he received a very hearty reception.

Col. H. M. Pellatt, the well-known stockbroker of Toronto, was elected a director of the Dominion Iron & Steel Co., at a meeting of directors held in Montreal on July 11th.

Professors McKay and Murray, of Dalhousie University, visited Sydney during the month to make arrangements for the establishment of classes in mining and civil engineering at Glace Bay and Sydney.

Mr. Burdette G. Elliott has assumed charge of the Northern Development Company's "Paymaster" property at Manitou. The shaft at this mine is now down 198 feet, and reported to be in good ore.

Mr. J. N. Patton has resigned the superintendentship of the Creighton mine, Copper Cliff, having left duing the month for New York. The property will, in future, be in charge of Captain Travers.

Dr. Frank D. Adams, Professor of Geology, McGill University, Montreal, who has been spending the summer holidays in Italy, expects to reach Montreal by the first of August.

Col. Geoffrey Porter, R.E., Director of the Calcutta Mint, India, is, it is announced, shortly to visit the Sudbury nickel mines on official business, the Indian Government having recently passed an Act authorizing the issuance of nickel coins.

Mr. B. F. Pearson, who has been prominently identified with the Dominion Iron & Steel and the Dominion Coal Companies since their inception, recently resigned his directorship on the Boards of these companies.

The Canadian Government recently appropriated $5,000 to be expended in the entertainment of the Institute of American Engineers in the Yukon. The money will be spent under the direction of Major Wood, Acting Governor.

Mr. Gustave Loeb, of the firm of Kuhn, Loeb & Co., of New York, spent, last month, several days in the Boundary district of British Columbia, visiting the Mother Lode mine, operated by the British Columbia Copper Company.

At the recent quarterly meeting of the Halifax Board of Trade, Mr. A. A. Hayward was elected chairman of the mine committee. At this committee's recommendation, the local government have now under consideration the appointment of a mining engineer to investigate the occurrences of iron ore in the province.

At a meeting of the Paint Section of the Canadian Manufacturers, it was decided to petition the Dominion Government to allow existing contracts up to June 30th, for white lead and lead in oil, to be carried out under the previous Customs regulations. This concession has since been granted by the Government.

Mr. R. H. Batty, who has acted as managing director of the Triune mine, near Ferguson, B.C., has resigned from his duties, on the ground that he is tired of the inconsistent actions of the board of directors. Mr. Batty's successor is a gentleman named Morton, who is said to have been a successful farmer.

Mr. A. C. Garde, who recently visited the valleys of the Upper Kootenay and Upper Columbia Rivers, in a recent interview expressed a very optimistic opinion concerning the future of the Windermere district. Mining developments here, however, are at present not making great headway, owing to the inaccessibility of the district.

In an interview, Mr. L. Pratt, of Sandon, who was largely instrumental, or rather who took a leading part in securing from the Dominion Government a bounty on lead produced in Canada, now expresses himself as opposed to any renewal of the bounty on lead ores exported.

Mr. Russell, the new manager of the Slough Creek Gravel Gold, at Cariboo, arrived at the mine last month from England, and in a cablegram to the London office states that he found the property in excellent order, and is satisfied with the general outlook. The company is now pumping 1,100,000 gallons of water every 24 hours.

The death occurred in Nelson, on July 7th, of Mrs. Blakemore, the wife of Mr. W. Blakemore, the well-known mining engineer. Mrs. Blakemore was a lady of charming personality and many accomplishments, and much sympathy is felt for Mr. Blakemore in the great loss which he has sustained.

The Brown Alaska Co.'s smelter, at Hadley, Prince of Wales Island, Alaska, the construction of which has been carried on under the direction of Mr. Paul Johnson, will, it is stated, be blown in in September. Mr. J. L. Parker, who was formerly in charge of the Brooklyn group in the Boundary district, and of the North Star mine at Kimberley, is now acting as this company's mine superintendent

In consequence of the retirement of Mr. Longley, Attorney-General of the Nova Scotia Legislature, who was recently elevated to the Supreme Court Bench, the Hon. Arthur Drysdale, Commissioner of Works and Mines, has been appointed Attorney-General for the province, while the Hon. W. T. Pipes has accepted the portfolio of Works and Mines.

The Rossland Miner states that Prof. Brock, of the Canadian Geological Survey, is making good progress with the structural survey of that district. A reconnaissance has been made of the area to be mapped, in order that an idea of the areal distribution of the different rocks may be more readily formulated. The bases for the triangulation work have been fixed, and preparations have been made in other respects.

The Dominion Coal Company is to be congratulated on having secured the services of Mr. Chas. Fergie, as superintendent of mines. Mr. Fergie is one of the most experienced and well informed authorities on coal mining in North America, and for the past sixteen years has acted as general manager of the Intercolonial Coal Company, of Westfield, N.S. Mr. Fergie's predecessor was Mr. Austin King, of Pittsburg, Pa.

Mr. W. Fleet Robertson, Provincial Mineralogist, British Columbia, is officially visiting the Bulkley Valley section in Northern British Columbia this season. This section is supposed to be rich in coal and mineral, but no authentic information is at present available concerning these resources. Mr. Robertson's report on the district will therefore be awaited with much interest, particularly as in the next few years the country will be opened up by the Grand Trunk Pacific.

Mr. R. W. Brigstocke, formerly manager of the Hunter V. and Fern mines, in the Nelson division of British Columbia, has been offered, and has accepted, the management of the Timmis property, in the Temiskaming district of Ontario. This property was recently described by Mr. Hardman in a recent article contributed to the Mining Review. Mr. Brigstocke arrived from the west during July and is now at the mine.

Mr. A. De Romeau, an eminent French geologist, bearing with him letters of introduction from the French Cabinet, is about to visit Canada with a view to studying the geological conditions of this country. Mr. De Romeau, who will, on his arrival, be the guest of Mr. B. A. C. Craig, of the Canada Corundum Company, is especially interested in corundum deposits, of which he has made a special study, and arrangements have been made to enable him to join parties of both the Dominion and Provincial geologists employed in field work in Ontario this year.

The spirit of conciliation and compromise which has characterized the attitude of the new management of the War Eagle and Centre Star mines towards its employees, is undoubtedly appreciated by the local Union, whose executive recently addressed a letter to Mr. T. G. Blackstock, of Toronto, thanking him on behalf of the Union for the friendly and generous settlement made in respect to the judgment the company had obtained against the Western Federation of Miners and the local Union, and expressing the belief that there would in future be industrial peace at the mine.

Mr. W. A. Stadelman, eastern agent of the Wellman-Seaver-Morgan Company, and who has been in charge of the eastern office at 42 Broadway, New York City, has been appointed general sales agent of the same company, with headquarters at Cleveland, O., taking effect July 1st. Mr. Fred Stadelman has been appointed assistant manager of the New York offices of the Wellman-Seaver-Morgan Company. Mr. Harry V. Croll, M.E., for the past eight years with the E. P. Allis Co., and their successors, Allis-Chalmers Co., of Chicago, has resigned and accepted a position with the Wellman-Seaver-Morgan Company, of Cleveland, O.

The Alumni of King's College, Windsor, have voted the sum of $3,000 towards the erection of a brick building in the town of Sydney, to be used as a new school of engineering. The report of the executive committee of the Alumni, concerning the college's efforts in the direction of establishing a college of engineering and school of mining in Cape Breton, was presented at a meeting held on June 21st. Mr. Hiram Donkin, in a speech, referred to the school of mining at Glace Bay, and stated that there were 7,000 men employed at the mines here within a radius of three miles. He anticipated that there would be a regular attendance at the school of 200 students. The establishment of a college of engineering and school of mining in Cape Breton is a new development. The advantages within reach at Sydney and Glace Bay make it possible to extend the engineering course so as to include not only civil engineering, but mechanical, electric and coal mining engineering. The work will be in charge of Prof. Dahl, who will reside at Sydney.

The Canadian Westinghouse Company, Limited, had a neat and attractive exhibit at the recent meeting of the Canadian Electrical Association. The headquarters were in Room No. 4 of the Hotel Windsor. Distributed at various places in the hotel were reproductions of the company's trade mark formed by electric light combinations. The company had on exhibition a line of their induction motors, direct current motors, OD transformers, series and multiple AC arc lamps, lightning arresters fuse blocks, portable testing instruments, etc. Distribution was made of a complete line of the company's literature illustrating and describ-

ing their products. A striking souvenir folder, prepared for the occasion, was given out to all the attendants of the convention. The following officials and representatives of the company were in attendance at the convention: Mr. Paul J. Myler, general manager; Mr. N. S. Braden, general sales manager; Mr. H. D. Bayne, manager, Montreal office; Mr. R. J. Dunlop, attache Toronto office; Mr. T. F. Dryden, manager Toronto office. Mr. Wm. Bradshaw, engineer, from Westinghouse Electric & Mfg. Co., East Pittsburg, Pa.

Mr. H. H. Claudet, the British Columbian representative of the Canadian Ore Concentration Company, recently visited the Slocan district. In Mr. Claudet's opinion, there are large quantities of ore in this section which might be advantageously treated by means of oil concentration. In this connection it is a well-known fact that in the Slocan much of the ore requires to be sorted by hand, which is an expensive operation, while, too, certain valuable constituents of these ores cannot be efficiently recovered by water concentration but would be amenable to oil. The company have already made a number of experiments on some of the concentrating ores of the Slocan district, and very satisfactory results were obtained in the saving of zinc and silver values. The company has, however, already expended a large sum of money in establishing plants at Rossland, and is therefore not in a position to install a mill in the Slocan as a speculative venture. Mr. Claudet, however, urges local men to form a syndicate, with a capital of $20,000, wherewith to install a 50-ton plant, which he is confident might be most profitably operated as a custom mill.

COMPANY NOTES.

Le Roi No. 2.—The manager's report for May contains the following information:—Output—11 cars of ore were shipped, making a total of 440 tons. Development—300 ft. level—The ore exposed in diamond drill hole No. 67, supposed to be the upward continuation of stope H ore, was opened up by a cross-cut. We drifted on the vein, first east until the fault was reached, then west, but in each case the showing was too poor to justify further working. In all, 91.6 feet were driven. 500 ft. level—The west drift from the north coss-cut was continued for a distance of 84.9 feet. The country is still broken up. Nothing of importance had been met with. May Day tunnel—81.5 feet have been driven. The ore encountered at this point is very promising, being 5 feet in width and assaying:—(1) .10 au. ozs. per ton, 2.0 cu. per cent., equal to $7.60 value; (2) .12 au. ozs. per ton, 3.5 cu. per cent., equal to $12.20 value; (3) .44 au. ozs. per ton, 4.7 cu. per cent., equal to $21.96 value. (N.B.—A cable has since been received stating that the tunnel has been extended to 100 feet, at which point it assays $44.) From the 100-ft. level, by means of the diamond drill, we shall, in the near future, explore for the downward continuation of this vein.

Le Roi No. 2.—The following report for June was cabled by the manager to the London office:—"Shipped to Trail 287 tons. The net receipts from Trail are $6,208, being payment for 362 tons shipped, and $1,248, being payment for 33 tons concentrates shipped. The net receipts from Greenwood are $2,889, being deferred payment on 984 tons previously shipped. Total receipts from both smelters, $10,381."

Fraser River Gold-Dredging Co. (1905) Limited.—This company was registered last month, with a capital of £40,000, to acquire the undertaking of the Fraser River Gold-Dredging Co., Limited (in liquidation). Head office, 39 Lombard Street, London, Eng.

Leamington Oil Syndicate, Limited.—This company has been formed in London, with a capital of £5,000, to acquire petroleum or oil-bearing lands in Canada or elsewhere.

Spyglass (Nelson).—At the annual meeting of this company, held in Nelson, on July 11th, the directors were re-elected. Mr. Bruce White was elected president; Mr. J. A. Magee, vice-president; and Mr. R. G. McLeod, secretary-treasurer.

COMPANY MEETINGS.

Kamloops Mines, Limited.—The first ordinary meeting of this company was held in London last month. The chairman stated that the debenture holders of the old company had agreed to accept similar debentures in the new organization. Liabilities taken over as at February 1st from the old company amounted to about £13,800, excluding debentures, and mine creditors, £3,400. Of the former amount £8,718 have been paid off; £3,272 have been remitted to the mine for the purpose of paying off the liabilities for plant machinery, while a further £1,000 has been since remitted.

At the mine, the new jigs have been added to the concentrating plant, and the whole of the machinery has been thoroughly overhauled and various additions and improvements made. Mr. Argall expects to treat 160 tons of ore per day. The board decided to add a smelting plant, the first unit to have a capacity of 50 tons per day. This was ordered and is now in course of erection, and the mine manager expects to have it in working order by the end of July. This smelting plant will save all the rail charges and smelter charges on the ore it treats. The saving on this plant alone is expected to be £800 per month. The latest news received by mail from the manager is to the effect that they have opened large additional bodies of ore at the 200-ft. level and the 500-ft. level, and that the 600-ft. level shows up equally well, the manager being of opinion that this level will produce more ore than any two of the upper levels. He further states that he was never more pleased with developments than at present. Mr. Morrish, who has gone very carefully over the ore developments, reports that there were $900,000 worth of high grade ore on February 11th, and sufficient low grade ore developed to keep the mill going at the rate of 160 tons per day for three years. The total footage at that date was 4,023 feet, as against 3,000 feet when Mr. Wm. Jones inspected the mine.

The North Star Mining Company, Limited.—At the Sixth Annual Meeting of this company, held in Montreal on the 28th of June, the directors reported that the operations for the year had resulted in a net profit of about $23,000, which, together with the Government bounty on the lead ores extracted, amounting to $17,000, gave a total of approximately $40,000. The directors speak in very high terms regarding the management of the property by Mr. M. McL. Curran, to whom they attribute these successful results. During the year small beds of ore from the old workings have been economically extracted, while, owing to advantageous freight and treatment rates, a quantity of low grade ore on hand was sold. About the end of February last, however, these small deposits became exhausted, and the mine was closed. Acting on the strong recommendation of Mr. Curran, the directors placed at his disposal a sum of money to continue prospecting operations in that section of the property adjacent to the Kellog Shaft, but at the time his report was submitted, the work was not sufficiently advanced to show results, although the prospects were reported as favourable. During the year two cash distributions were made to shareholders, amounting to ten cents per share. Mr. Curran, the manager, submitted the following report:—

It is not necessary to draw your attention to the very depressing state of affairs in connection with this property at the opening of the year; but, in face of such, I feel much gratification at being able to show you a net profit for that period of about $48,000.

My instructions with regard to the handling of the property were very closely defined, and were as closely followed. But during the year there has been many feet of development work added to the property in the legitimate work of "Mining Ore," and at the same time every favourable showing has been carefully examined and worked on, with the hope of extending the old ore body.

Your company was fortunate in being able to get a market for second class ore, this ore being mined at excellent profit, and at the same time allowing the working out "clean" of the old ore body.

While in Montreal I had the honor of waiting on your Board, and I pointed out that there was a portion of the property that was practically unprospected. I refer to the ground adjacent to the Kellog Shaft. I pointed out to your directors that till this area had been carefully worked the North Star property could not be said to be thoroughly prospected.

Your directors showed sufficient confidence in my judgment to ask me to undertake the work, and, acting on such instructions as I then received, I returned to the property and have had for about two weeks four or five men at work, and the favourable indications confirm my already expressed opinion as to the value of this ground.

Standard Explosives, Ltd.—This company was incorporated in May last with a capital of $300,000. Their head office is in the Board of Trade Building, Montreal, and the works are situated on "Ile Perrot," near Vaudreuil, P. Q., with excellent shipping facilities. The Canadian Pacific and Grand Trunk roads run through the property, and there is also water connection. The first meeting of the shareholders was held on June 13th, at which the following named were elected as directors for the ensuing year:—Messrs. W. T. Rodden and J. F. Johnson, of Montreal; S. H. C. Miner, of Granby; James W. Woods, of Ottawa; and Chas. W. Dimick, of Boston.

At a directors' meeting held subsequent to the above, Mr. W. T. Rodden was appointed managing director, and Mr. J. F. Johnson, secretary-treasurer. The two latter gentlemen have had a number of years' experience in the explosive business.

The plant will be modern in every respect, and of sufficient capacity to enable the company to contract with the largest mining concerns and railway contractors for their requirements.

INDUSTRIAL NOTES.

The Canadian White Co., Limited, with headquarters in the Sovereign Bank Building, Montreal, have recently been granted letters patent to carry on in Canada a general contracting and engineering business, on similar lines to the "J. G. White & Company, Incorporated," of New York; "J. G. White & Company, Limited," of London, England, and the "Waring-White Building Company, Limited," London, England. This corporation will be fully equipped to handle large construction contracts for steam and electric railways, and to design, build, equip and operate electric lighting plants and power installations, gas works, water supply, sewage systems, piers, docks, harbor works, office buildings, apartment houses, etc. It will have upon its Board and as shareholders, strong and representative business men, well known throughout Canada. The general manager of the company will be a prominent civil engineer, with large experience in railway construction, etc., and one who has held executive positions. Mr. H. P. Douglas, formerly vice-president and general manager of the Canadian Otis Elevator Company, Limited, will be its treasurer. Mr. H. P. Hitch, who has been for several years connected with the Thompson-Starrett Company, of New York, as superintendent, and who had full charge of the erection of the Union Bank Building at Winnipeg, will be superintendent of building construction. The contracting and engineering staff will be composed of competent engineers, who have had long and thorough experience. The Canadian White Company will have the advantage at all times of the services and experience of the New York and London kindred corporations, insuring all the benefits and advantages which accrue from a long and successful experience in the business of contracting and engineering. An organization like the above, with its allied interests, is of advantage to Canada, and will doubtless give prompt attention to any contracting or engineering matter with which it may be entrusted.

In connection with the transfer of the business of the Fairbanks Co. in Canada to the Canadian Fairbanks Co., Limited, of which latter concern Mr. Henry J. Fuller, late manager of the Fairbanks Company of Canada, is president, it may be mentioned that the company has moved to new quarters at 444 St. James Street, as the old premises were entirely inadequate for the rapidly increasing business. The new warehouse has been fitted up very elaborately. The first floor contains general offices, show rooms and shipping department, and by means of a travelling trolley, large pieces of machinery and heavy material can be easily handled and moved from one place to another. The executive offices of the company and the advertising and publishing department are on the second floor, the rest of the building being occupied with the large stock carried. The growth of this company in Canada is phenomenal, the business having been started by Mr. Fuller, six years ago, as a small sales office in Montreal. It now consists of the executive offices and warehouse at Montreal, and branch warehouses at Toronto, Winnipeg and Vancouver. Fairbanks-Morse & Co., of Chicago, for whom the Canadian Fairbanks Co. are sole sales agents in Canada, have completed arrangements for the erection of a large factory at Toronto for the manufacture of gas and gasoline engines, machinery and mining, mill and railway supplies. This concern manufactures all kinds of conveying apparatus for mines and quarries, also hoisting engines, steam pumps, ore cars, etc., etc. The selling staff of the company will at once be enlarged to take care of additional lines which they now handle.

The Canadian Rubber Company, of Montreal, Limited, have issued some handsome catalogues during the past few weeks. Catalogue "C" deals comprehensively with Interlocking Rubber Tiling and other unique rubber floor coverings. The catalogue is printed in several colors, and all the illustrations are in half-tone. Catalogue "D" is devoted exclusively to Rubber Belting and Rubber Covered Rolls. The book comprises 90 pages, with a handsome embossed cover in gold and black. A quantity of valuable information concerning the care and use of rubber belting is here given, and the illustrations, of which there are a great number, are all in half-tone. This belting catalogue will no doubt be keenly sought after by the trade. Catalogue "E" (60 pages, with cover) describes the principal lines of rubber and special hose manufactured. Much valuable information is given as to the care of hose, and many half-tone illustrations accompany the text. This catalogue is in keeping with the other high-grade trade catalogues of the Canadian Rubber Company. Any of the catalogues issued can be obtained from the sales branches of the company throughout Canada, or direct from the head office, Montreal.

Messrs. Wayland, Williams & Dadson, who are making a specialty of gas engines and gas-producing plants, have removed their offices from the Board of Trade Building to 321 St James Street, Montreal. This is a young but progressive firm. They already have a couple of suction gas plants installed in Montreal, and their new location should bring them more prominently before the public.

The Robb Engineering Company has received an order for two 100 horse-power Robb-Mumford boilers from the Western Canadian Collieries, Blairmore, Alberta. This company has also received an order from the Dominion Coal Company for two 100 horse-power Robb-Mumford boilers.

The Canadian Westinghouse Co., Limited, Hamilton, Ont., have issued a well printed and handsomely illustrated catalogue of electrical apparatus manufactured at the Canadian works. Copies of this catalogue may be obtained by applying to the general office of the company at Hamilton.

The Locomotive & Machine Company, of Montreal, Limited, publish a catalogue descriptive of the Atlantic Shovel designed by Mr. A. W. Robinson, M.A.Sc.E. The catalogue contains an interesting preface relating to the requirements of the modern shovel.

We have received from the Wellman-Seaver-Morgan Company, Cleveland, Ohio, a catalogue descriptive of mine cages, skips or cars, and sheaves. The catalogue contains upwards of 40 pages, and is illustrated throughout.

DIGEST OF RECENT PATENTS—MINING AND METALLURGICAL.

Specially reported for the Canadian Mining Review.

June 13, 1905.

792,440.—Apparatus for treating ferriginous ore for the manufacture of iron and steel therefrom. Montague Moore, Melbourne, and Thomas J. Heskett, Brunswick, Victoria, Australia. The combination of a gas-furnace, an inclined revolving cylindrical deoxidizing-chamber, and a vertical chamber connecting the lower end of the former with the upper end of the latter chamber, said vertical chamber being provided with air-inlets, and said chamber with means such as for supplying gas thereto.

792,223.—Metallurgical Furnace. Jacob Lansing, San Francisco, Cal. The combination of a furnace having a plurality of upright inter-connected furnaces, each having a normally closed ore-chamber and a fire-box beneath the ore charge, a water-containing receptacle, a connection between each ore-chamber and the receptacle, a stack separate from and devoid of connection with the water-containing receptacle, connections between the fire-boxes of the furnaces and said stack and valves in the connections by which the heat of the furnace-fires may be diverted from the ore-chambers, means for inducing a draft through the receptacle, and the ore-chambers and intermediate connections, and means for maintaining a continued circulation of cooling fluid through the receptacle.

792,022.—Electric Furnace. Ernst Haagn, Hanau, Germany, assignor to the firm of W. C. Herasus, Hanau, Germany. The combination with a recess in the wall of the furnace and reaching to near its heating or melting chamber, of a conductor-piece leading to said heating or melting chamber, and engaging in said recess, and a metal indicator connecting the ends of said conductor-piece and said conductor in said recess and being so disposed that it can be watched from without and indicate by its commencing red heat the correct strength of the current.

June 20, 1905.

792,642.—Melting Furnace. William E. Williams, Chicago, Ill. A furnace provided with a single opening and mounted to be revolved in two planes, combined with a set of fixed concentric flues for supplying air and fuel for discharging furnace-gases, respectively, and means for connecting the furnace and flues and otherwise closing the former, and means for rotating the furnace while so connected.

792,776.—Magnetic Separator.—Elwin C. Kavanaugh, Holyoke, Mass. In a magnetic separator, an enclosed magnetic cylinder rotatably mounted in a pulp receptacle, or conduit, having pole-pieces and magnet-coils therein, and having a hollow endwise extending journal, combined with a receptacle connected with the hollow journal, and a quantity of oil in part contained in said receptacle and filling the space within the magnetic cylinder.

792,729.—Briqueting or Moulding Machine. Grant W. Rigby, Pittsburg, Pa. The combination with a machine-frame, a reciprocating feed-box provided with mould-recesses therein, reciprocating plungers adapted to enter said mould-recesses, a rod within said feed-box, agitator-bars on said rod, a bracket on said frame having a slot therein, and a crank-lever connected to said rod and engaging with said slot for moving said rod to agitate the material within said feed-box during the movement of the latter.

792,619.—Portable Furnace for melting steel or other metals. Louis Rousseau, Argenteuil, France. The combination with a combustion-chamber of a juxtaposed circular chamber, conduits or flues connecting the two chambers, supports fixed in the second chamber, a crucible resting on said supports, a conduit divided into two branches leading respectively under the combustion-chamber and into the space around said chamber, a vertical rod crossing the two branches, a valve in each branch mounted upon the said vertical rod, the two valves being located at right angles to each other, a removable cover upon the combustion chamber, a tube projecting through this cover, and means for tilting the furnace.

792,660.—Dumping-Car. Daniel King, Pinkney, Tenn. A dumping-car, a truck-frame having transverse truck-beams near each end, a rock-shaft having bearings on said beams, a body-beam near each end of the car and firmly attached to said shaft, outside the truck beams, and a body supported thereby, and means for holding the body-beams to prevent rocking save when the car is dumped, all combined.

792,682.—Coal or Grain Distributing Apparatus. Charles A. Turner, Norfolk, Va.—The combination with a vertical shaft, a table thereon, and radial wings or vanes secured to the upper face of the table, of a bracket engaging the under side of the table, means for suspending said bracket from a support above the same, and means for rotating the shaft.

June 27, 1905.

793,392.—Furnace for Limekilns or other Structures. John D. Owens, Marion Ohio. An upper main combustion-chamber having a flame outlet and a charging-door, the floor of said chamber being formed of grate-bars spaced as described, a lower auxiliary combustion-chamber having an inperforate floor to receive the partly-burned fuel falling from the upper chamber, a passage extending upward from the lower chamber to a point below the grate of the upper chamber, and an air-supply conduit arranged to conduct the air from the exterior over the fuel in the lower chamber to the upwardly-extending passage, whereby said upwardly-extending passage conducts the air and the gases from the lower chamber and constitutes the air-supplying means for the upper chamber, and means located within said passage below the grate for controlling the amount and equalizing the delivery to the grate of the air and partially-consumed gases.

793,150.—Dump-Car. Spencer Otis, Chicago, Ill., and George B. Maltby, Cleveland, Ohio, assignors to National Coal Dump-Car Company, Rapid City, S.D., a corporation of South Dakota. The combination of a supporting-frame portion provided with centre sills, a body-bolster for each end of the car arranged underneath the centre sills and extending transversely of the same, discontinuous sub-bolsters arranged between the body-bolster and the floor level of the car and extending out from each side of the centre sills, and truss-rods extending from end to end of the car and passed over the inner ends of the sub body-bolsters.

793,238.—Discharge for Coke-Ovens. Carl Schroeter, Chicago, Ill. A discharger for coke-ovens and retorts adapted to remain in the coking-chamber during the coking operation, and comprising a metal plate equal in width to the oven and bent at substantially right angles to form a horizontal member lying upon the sole of the retort and a vertical member of substantially the height of the charge, a similarly-bent bar constituting a reinforcing-rib secured to said plate longitudinally and substantially centrally thereof, and a pair of tie-rods uniting the free ends of said horizontal and vertical members.

July 4, 1905.

793,816.—Ore-Treating Furnace. Aaron M. Beam, Denver, Colo. In an ore-treating furnace, a rotary flue-cylinder, one end of which connects with a smoke-stack, while its other extremity projects into a combustion-chamber, a stationary conduit extending through said combustion-chamber, an ore-cylinder concentrically located inside and attached to said rotary flue-cylinder, its extremity extending into and being covered by said stationary conduit, suitable means for feeding ore into and through said ore-cylinder into said conduit, and means for conveying the ore through said conduit.

793,668.—Coke-Oven Attachment. Daniel F. Lepley, Connellsville, Pa. In an apparatus for the utilization of waste gases from coke-ovens, a gas-conduit and an adjustable flue member movable to a position to place the charging-hole of the coke-oven in communication with said conduit, or to open the same to the outer air.

793,926.—Conveyor for Metal Bars. Victor E. Edwards, Worcester, Mass., assignor to Morgan Construction Company, Worcester, Mass., a corporation of Massachusetts. The combination of a series of conveyor-bars, teeth projecting from said bars, and having inclined sides and arranged in alternating rows or series, with the inclined sides of the teeth in one series overlapping the inclined sides of the teeth in the next adjacent series, and means for bringing the different series successively into supporting relation to a metal bar held thereon.

793,795.—Briquet, and Process for making same. Edward E. Marsh, Los Angeles, Cal., assignor of one-half to William P. Wagy, Los Angeles, Cal. A briquet comprising coal and lime or gypsum thoroughly intermingled and moistened by a solution of gelatin and bichromate of potash in substantially equal parts.

793,720.—Apparatus for Separating Slimes, etc., from Metal-bearing Solutions. Ernest L. Godbe, Salt Lake City, Utah. An apparatus comprising a tank, a revoluble drum working therein, a filtering medium fixed to the periphery of the drum, suction mechanism coacting with the interior of the drum, a scraping device coacting with its exterior, and an apron depending from the scraper adjacent to the face of the filtering medium and entering the tank to maintain a vacuum within the drum.

PROVINCE OF QUEBEC

The attention of Miners and Capitalists in the United States and in Europe is invited to the

GREAT MINERAL TERRITORY

Open for investment in the Province of Quebec.

Gold, Silver, Copper, Iron, Asbestos, Mica, Plumbago, Phosphate, Chromic Iron, Galena, Etc.

ORNAMENTAL AND STRUCTURAL MATERIALS IN ABUNDANT VARIETY.

The Mining Law gives absolute security to Title, and has been specially framed for the encouragement of Mining.

Mining concessions are divided into three classes :—

1. In unsurveyed territory (*a*) the first class contains 400 acres, (*b*) the second, 200 acres, and (*c*) the third, 100 acres.

2. In surveyed townships the three classes respectively comprise one, two and four lots.

All lands supposed to contain mines or ores belonging to the Crown may be acquired from the Commissioner of Colonization and Mines (*a*) as a mining concession by purchase, or (*b*) be occupied and worked under a mining license.

No sale of mining concessions containing more than 400 acres in superficies can be made by the Commissioner to the same person. The Governor-in-Council may, however, grant a larger extent of territory up to 1,000 acres under special circumstances.

The rates charged and to be paid in full at the time of the purchase are $5 and $10 per acre for mining lands containing the superior metals* ; the first named price being for lands situated more than 12 miles and the last named for lands situated less than 12 miles from the railway.

If containing the inferior metal, $2 and $4 according to distance from railway

Unless stipulated to the contrary in the letters patent in concessions for the mining of superior metals, the purchaser has the right to mine for all metals found therein ; in concessions for the mining of the inferior metals, those only may be mined for.

*The superior metals include the ores of gold, silver, lead, copper, nickel, graphite, asbestos, mica, and phosphate of lime. The words inferior metals include all other minerals, and ores.

Mining lands are sold on the express condition that the purchaser shall commence *bona fide* to mine within two years from the date of purchase, and shall not spend less than $500 if mining for the superior metals ; and not less than $200 if for inferior metals. In default, cancellation of sale of mining lands

(*b*) Licenses may be obtained from the Commissioner on the following terms :—Application for an exploration and prospecting license, if the mine is on private land, $2 for every 100 acres or fraction of 100 ; if the mine is on Crown lands (1) in surveyed territory, $5 for every 100 acres, and (2) in unsurveyed territory, $5 for each square mile, the license to be valid for three months and renewable. The holder of such license may afterwards purchase the mine, paying the prices mentioned.

Licenses for mining are of two kinds: Private lands licenses where the mining rights belong to the Crown, and public lands licenses. These licenses are granted on payment of a fee of $5 and an annual rental of $1 per acre. Each license is granted for 200 acres or less, but not for more ; is valid for one year, and is renewable on the same terms as those on which it was originally granted. The Governor-in-Council may at any time require the payment of the royalty in lieu of fees for a mining license and the annual rental—such royalties, unless otherwise determined by letters patent or other title from the Crown, being fixed at a rate not to exceed three per cent. of the value at the mine of the mineral extracted after deducting the cost of mining it.

The fullest information will be cheerfully given on application to

THE MINISTER OF LANDS, MINES AND FISHERIES,
PARLIAMENT BUILDINGS, QUEBEC.

Ontario's Mining Lands..

THE Crown domain of the Province of Ontario contains an area of over 100,000,000 acres, a large part of which is comprised in geological formations known to carry valuable minerals and extending northward from the great lakes and westward from the Ottawa river to the Manitoba boundary.

Iron in large bodies of magnetite and hematite: copper in sulphide and native form; gold, mostly in free milling quartz; silver, native and sulphides; zincblende, galena, pyrites, mica, graphite, talc, marl, brick clay, building stones of all kinds and other useful minerals have been found in many places, and are being worked at the present time.

In the famous Sudbury region Ontario possesses one of the two sources of the world's supply of nickel, and the known deposits of this metal are very large. Recent discoveries of corundum in Eastern Ontario are believed to be the most extensive in existence.

The output of iron, copper and nickel in 1903 was much beyond that of any previous year, and large developments in these industries are now going on.

In the older parts of the Province salt, petroleum and natural gas are important products.

The mining laws of Ontario are liberal, and the prices of mineral lands low. Title by freehold or lease, on working conditions for seven years. There are no royalties.

The climate is unsurpassed, wood and water are plentiful, and in the summer season the prospector can go almost anywhere in a canoe.

The Canadian Pacific Railway runs through the entire mineral belt.

For reports of the Bureau of Mines, maps, mining laws, etc., apply to

HON. FRANK COCHRANE,
Commissioner of Lands and Mines.

or

THOS. W. GIBSON,
Director Bureau of Mines,
Toronto, Ontario.

Dominion of Canada

SYNOPSIS OF REGULATIONS

For disposal of Minerals on Dominion Lands in Manitoba, the North-west Territories and the Yukon Territory.

COAL.

Coal lands may be purchased at $10 per acre for soft coal and $20 for anthracite. Not more than 320 acres can be acquired by one individual or company. Royalty at the rate of ten cents per ton of 2,000 pounds shall be collected on the gross output.

QUARTZ.

Persons of eighteen years and over and joint stock companies holding free miner's certificates may obtain entry for a mining location.

A free miner's certificate is granted for one or more years, not exceeding five, upon payment in advance of $7.50 per annum for an individual, and from $50 to $100 per annum for a company, according to capital.

A free miner, having discovered mineral in place, may locate a claim 1500 x 1500 feet by marking out the same with two legal posts, bearing location notices, one at each end on the line of the lode or vein.

The claim shall be recorded within 15 days if located within ten miles of a mining recorder's office, one additional day allowed for every additional ten miles or fraction. The fee for recording a claim is $5.

At least $100 must be expended on the claim each year or paid to the mining recorder in lieu thereof. When $500 has been expended or paid, the locator may, upon having a survey made, and upon complying with other requirements, purchase the land at $1.00 an acre.

Permission may be granted by the Minister of the Interior to locate claims containing iron and mica, also copper, in the Yukon Territory of an area not extending 160 acres.

The patent for a mining location shall provide for the payment of a Royalty ot 2½ per cent. of the sales of the products of the location.

PLACER MINING.

Manitoba and the N. W. T., excepting the Yukon Territory.—Placer mining claims generally are 100 feet square; entry fee $5, renewable yearly. On the North Saskatchewan River claims are either bar or bench, the former being 100 feet long and extending between high and low water mark. The latter includes bar diggings, but extends back to the base of the hill or bank, but not exceeding 1,000 feet. Where steam power is used, claims 200 feet wide may be obtained.

Dredging in the rivers of Manitoba and the N. W. T., excepting the Yukon Territory.—A free miner may obtain only two leases of five miles each for a term of twenty years, renewable in the discretion of the Minister of the Interior.

The lessee's right is confined to the submerged bed or bars of the river below low water mark, and subject to the rights of all persons who have, or who may receive entries for bar diggings or bench claims, except on the Saskatchewan River, where the lessee may dredge to high water mark on each alternate leasehold.

The lessee shall have a dredge in operation within one season from the date of the lease for each five miles, but where a person or company has obtained more than one lease one dredge for each fifteen miles or fraction is sufficient. Rental, $10 per annum for each mile of river leased. Royalty at the rate of two and a half per cent. collected on the output after it exceeds $10,000.

DREDGING IN THE YUKON TERRITORY.

Six leases of five miles each may be granted to a free miner for a term of twenty years, also renewable.

The lessee's right is confined to the submerged bed or bars in the river below low water mark, that boundary to be fixed by its position on the 1st day of August in the year of the date of the lease.

The lessee shall have one dredge in operation within two years from the date of the lease, and one dredge for each five miles within six years from such date. Rental, $100 per mile for first year and $10 per mile for each subsequent year. Royalty, same as placer mining.

PLACER MINING IN THE YUKON TERRITORY.

Creek, gulch, river and hill claims shall not exceed 250 feet in length, measured on the base line or general direction of the creek or gulch, the width being from 1,000 to 2,000 feet. All other placer claims shall be 250 feet square.

Claims are marked by two legal posts, one at each end, bearing notices. Entry must be made within ten days, if the claim is within ten miles of mining recorder's office. One extra day allowed for each additional ten miles or fraction.

The person or company staking a claim must hold a free miner's certificate.

The discoverer of a new mine is entitled to a claim of 1,000 feet in length, and if the party consists of two, 1,500 feet altogether, on the output of which no royalty shall be charged, the rest of the party ordinary claims only.

Entry fee, $10. Royalty at the rate of two and one-half per cent. on the value of the gold shipped from the Yukon Territory to be paid to the Comptroller.

No free miner shall receive a grant of more than one mining claim on each separate river, creek or gulch, but the same miner may hold any number of claims by purchase, and free miners may work their claims in partnership by filing notice and paying fee of $2. A claim may be abandoned, and another obtained on the same creek, gulch or river, by giving notice and paying a fee.

Work must be done on a claim each year to the value of at least $200.

A certificate that work has been done must be obtained each year; if not, the claim shall be deemed to be abandoned, and open to occupation and entry by a free miner.

The boundaries of a claim may be defined absolutely by having a survey made and publishing notices in the Yukon Official Gazette.

PETROLEUM.

All unappropriated Dominion Lands in Manitoba, the North-West Territories and within the Yukon Territory are open to prospecting for petroleum, and the Minister may reserve for an individual or company having machinery on the land to be prospected, an area of 640 acres. Should the prospector discover oil in paying quantities, and satisfactorily establish such discovery, an area not exceeding 640 acres, including the oil well and such other land as may be determined, will be sold to the discoverer at the rate of $1.00 an acre subject to royalty at such rate as may be specified by order-in-council.

Department of the Interior.

Ottawa, February, 1904.

W. W. CORY,

Deputy of the Minister of the Interior.

PROVINCE OF NOVA SCOTIA.

Leases for Mines of Gold, Silver, Coal, Iron, Copper, Lead, Tin

—AND—

PRECIOUS STONES.

TITLES GIVEN DIRECT FROM THE CROWN, ROYALTIES AND RENTALS MODERATE.

GOLD AND SILVER.

Under the provisions of Chap. 1, Acts of 1892, of Mines and Minerals, Licenses are issued for prospecting Gold and Silver for a term of twelve months. Mines of Gold and Silver are laid off in areas of 150 by 250 feet, any number of which up to one hundred can be included in one License, provided that the length of the block does not exceed twice its width. The cost is 50 cents per area. Leases of any number of areas are granted for a term of 40 years at $2.00 per area. These leases are forfeitable if not worked, but advantage can be taken of a recent Act by which on payment of 50 cents annually for each area contained in the lease it becomes non-forfeitable if the labor be not performed.

Licenses are issued to owners of quartz crushing mills, who are required to pay Royalty on all the Gold they extract at the rate of two per cent. on smelted Gold valued at $19 an ounce, and on smelted Gold valued at $18 an ounce.

Applications for Licenses or Leases are receivable at the office of the Commissioner of Public Works and Mines each week day from 10 a.m. to 4 p.m., except Saturday, when the hours are from 10 to 1. Licenses are issued in the order of application according to priority. If a person discovers Gold in any part of the Province, he may stake out the boundaries of the areas he desires to obtain, and this gives him one week and twenty-four hours for every 15 miles from Halifax in which to make application at the Department for his ground.

MINES OTHER THAN GOLD AND SILVER.

Licences to search for eighteen months are issued, at a cost of thirty dollars, for minerals other than Gold and Silver, out of which areas can be selected for mining under lease. These leases are for four renewable terms of twenty years each. The cost for the first year is fifty dollars, and an annual rental of thirty dollars secures each lease from liability to forfeiture for non-working.

All rentals are refunded if afterwards the areas are worked and pay royalties. All titles, transfers, etc., of minerals are registered by the Mines Department for a nominal fee, and provision is made for lessees and licensees whereby they can acquire promptly, either by arrangement with the owner or by arbitration, all land required for their mining works.

The Government as a security for the payment of royalties, makes the royalties first lien on the plant and fixtures of the mine.

The unusually generous conditions under which the Government of Nova Scotia grants its minerals have introduced many outside capitalists, who have always stated that the Mining laws of the Province were the best they had had experience of.

The royalties on the remaining minerals are: Copper, four cents on every unit; Lead, two cents upon every unit; Iron, five cents on every ton; Tin and Precious Stones, five per cent.; Coal, 10 cents on every ton sold.

The Gold district of the Province extends along its entire Atlantic coast, and varies in width from 10 to 40 miles, and embraces an area of over three thousand miles, and is traversed by good roads and accessible at all points by water. Coal is known in the Counties of Cumberland, Colchester, Pictou and Antigonish, and at numerous points in the Island of Cape Breton. The ores of Iron, Copper, etc., are met at numerous points, and are being rapidly secured by miners and investors.

Copies of the Mining Law and any information can be had on application to

THE HON. W. T. PIPES,

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PROVINCE OF QUEBEC

The attention of Miners and Capitalists in the United States and in Europe is invited to the

GREAT MINERAL TERRITORY

Open for investment in the Province of Quebec.

Gold, Silver, Copper, Iron, Asbestos, Mica, Plumbago, Phosphate, Chromic Iron, Galena, Etc.

ORNAMENTAL AND STRUCTURAL MATERIALS IN ABUNDANT VARIETY.

The Mining Law gives absolute security to Title, and has been specially framed for the encouragement of Mining.

Mining concessions are divided into three classes :—

1. In unsurveyed territory (*a*) the first class contains 400 acres, (*b*) the second, 200 acres, and (*c*) the third, 100 acres.

2. In surveyed townships the three classes respectively comprise one, two and four lots.

All lands supposed to contain mines or ores belonging to the Crown may be acquired from the Commissioner of Colonization and Mines (*a*) as a mining concession by purchase, or (*b*) be occupied and worked under a mining license.

No sale of mining concessions containing more than 400 acres in superficies can be made by the Commissioner to the same person. The Governor-in-Council may, however, grant a larger extent of territory up to 1,000 acres under special circumstances.

The rates charged and to be paid in full at the time of the purchase are $5 and $10 per acre for mining lands containing the superior metals* ; the first named price being for lands situated more than 12 miles and the last named for lands situated less than 12 miles from the railway.

If containing the inferior metal, $2 and $4 according to distance from railway

Unless stipulated to the contrary in the letters patent in concessions for the mining of superior metals, the purchaser has the right to mine for all metals found therein ; in concessions for the mining of the inferior metals, those only may be mined for.

*The superior metals include the ores of gold, silver, lead, copper, nickel, graphite, asbestos, mica, and phosphate of lime. The words inferior metals include all other minerals, and ores.

Mining lands are sold on the express condition that the purchaser shall commence *bona fide* to mine within two years from the date of purchase, and shall not spend less than $500 if mining for the superior metals ; and not less than $200 if for inferior metals. In default, cancellation of sale of mining lands

(*b*) Licenses may be obtained from the Commissioner on the following terms :—Application for an exploration and prospecting license, if the mine is on private land, $2 for every 100 acres or fraction of 100 ; if the mine is on Crown lands (1) in surveyed territory, $5 for every 100 acres, and (2) in unsurveyed territory, $5 for each square mile, the license to be valid for three months and renewable. The holder of such license may afterwards purchase the mine, paying the prices mentioned.

Licenses for mining are of two kinds: Private lands licenses where the mining rights belong to the Crown, and public lands licenses. These licenses are granted on payment of a fee of $5 and an annual rental of $1 per acre. Each license is granted for 200 acres or less, but not for more ; is valid for one year, and is renewable on the same terms as those on which it was originally granted. The Governor-in-Council may at any time require the payment of the royalty in lieu of fees for a mining license and the annual rental—such royalties, unless otherwise determined by letters patent or other title from the Crown, being fixed at a rate not to exceed three per cent. of the value at the mine of the mineral extracted after deducting the cost of mining it.

The fullest information will be cheerfully given on application to

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HALIFAX, NOVA SCOTIA.

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It can cut through 2,500 feet of solid rock in a vertical line. It brings up solid cylinders of rock, showing formation and character.

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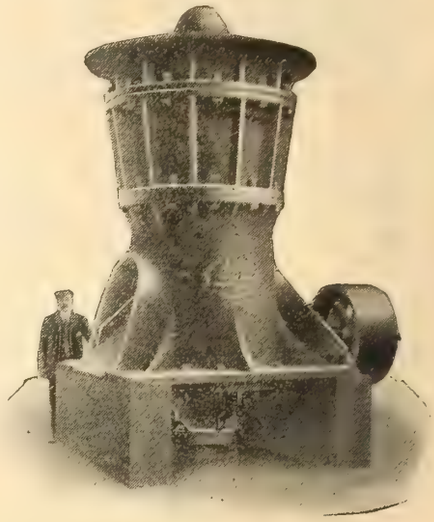

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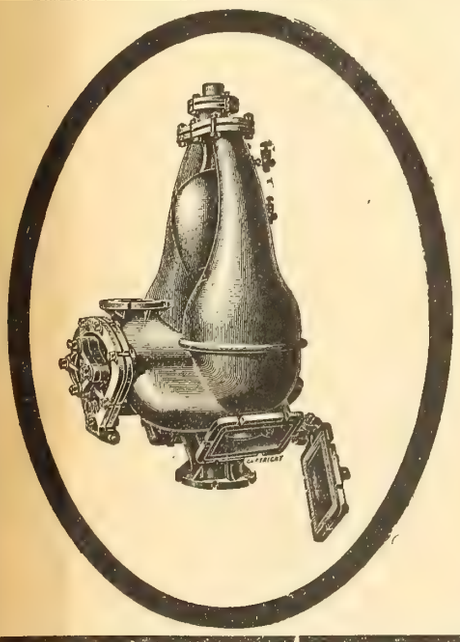

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The water can often be got out
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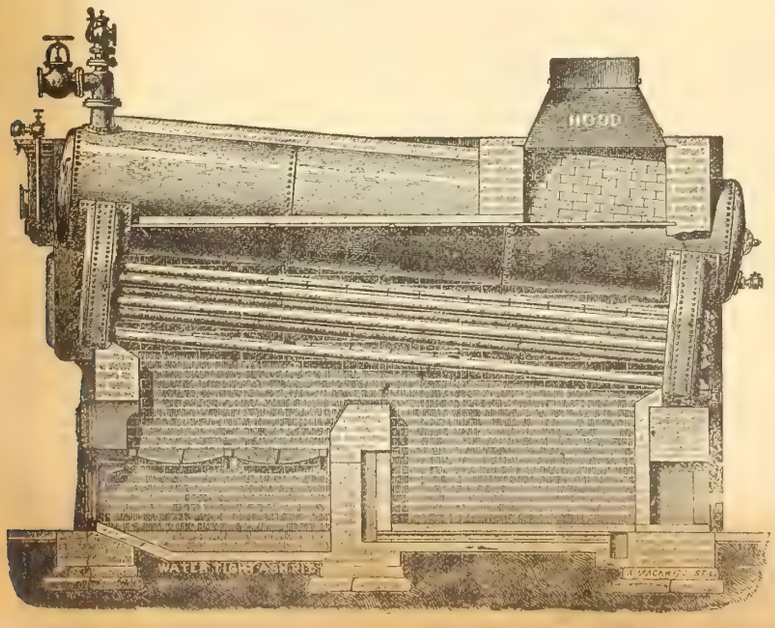
The Pulsometer Engineering Co. Ld., Reading, England.

CANADIAN REPRESENTATIVES PEACOCK BROTHERS CANADA LIFE BUILDING Montreal



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MANUFACTURED BY

The Canadian Heine Safety Boiler Co.

TORONTO, ONT.

THE HEINE SAFETY BOILER—Made in units of 100 to 500 h.p., and can be set in batteries of any number. Suitable for Mines, Pulp Mills, Water and Electric Installations, and large plants generally. The best and most economical boiler made.